THE
Malayan Agricultural Journal
JULY, 1947

EDITORIAL.

Off Season Crops on Padi Land

The utilisation of padi areas for the growing of crops, other than rice, in the off season was not practised to any large extent in the years preceeding the war. At present, however, with the need to produce food becoming more urgent, as it is realised that imports of rice are likely to fall below expectations, increased food production on all available and potential areas is of considerable importance.

Generally speaking the rice crop occupies the land for about six months of the year, and for various reasons it is not practicable to attempt to grow two crops of rice per annum, on a large scale, on the same land. During the period of occupation, the Japanese attempted to establish in Malaya the practice of growing varieties of short maturation padi in the inter-crop period. The results were far from satisfactory and it is doubtful if yields of padi could be maintained locally by this system so as to ensure that two light crops per annum would even equal one main crop, furthermore difficulties connected with irrigation in the off season would also reduce the chances of success.

In the article by Mr. Hartley included in this number of the Journal, it is shown that, on the type of soil on Bukit Merah Padi Station, satisfactory crops of groundnuts can be obtained in the off season by application of lime; and of other crops e.g. sweet potato, ladies finger, brinjal and cow-pea by the use of cattle or buffalo manure. It appears that increased yields of padi are obtained on this soil following cultivation in the off season and that it is the cultivation and not the manuring which produces the subsequent increased padi yield, although it is possible that liming for groundnuts may also lead to an increase. The need for adequate control of drainage in padi areas during the off season is stressed, since without it the possibility of loss of the entire off-season crops cannot be ignored.

Ubi Kemili.

A food crop which is popular in Province Wellesley is a low growing herb called, locally, "ubi kemili;" the plants produce edible tubers in clusters at the base of the stem. This crop does not appear to require manure on normally fertile soils, but good drainage is essential. Yields are high and a good price is obtained for the tubers.

We publish in the present number of the Journal an article by Mohd. Sa'aid bin Sheik Daud, Agricultural Assistant, which gives information on the methods adopted in Province Wellesley for propagation,

cultivation, harvesting and uses of this food crop. Suggestions for further investigation of these methods with the object of extending and improving the cultivation of ubi kemili are also mentioned.

Manila Hemp. Abaca fibre or Manila hemp is obtained from the pseudo-stem of the plant, *Musa textilis*, which belongs to the same genus as the banana. The fibre from Manila hemp is the most valuable of all fibres for the making of ropes used as marine cordage due to its strength, resistance to the action of sea water and suitability for use in block and pulley tackle.

The present world shortage of all hard fibres has resulted in a considerable rise in the market price of Manila hemp and has focussed attention on the possibility of extending the cultivation of this plant in Malaya, where, up to now, the crop has only been grown under experimental conditions by the Department of Agriculture and by a few European-managed estates. Further experiments, in the cultivation of this crop have begun.

Manila hemp requires a good, rich, well drained soil with a continuous supply of soil moisture and should find suitable conditions on alluvial soils in river valleys or certain coastal areas.

Samples of fibre prepared from three varieties of *M. textilis*, formerly imported from the Philippines and grown at the Central Experiment Station, Serdang, were submitted to the Imperial Institute, London, in December, 1946, for examination and report. The report, part of which is included in the article on Manila hemp published in this issue of the Journal, is encouraging, and indicates that the Malayan produced fibre could compete favourably with fibre produced in other parts of the world.

Emphasis is laid, however, on the fact that the market price is, at present, very much inflated and it would be unwise to count on obtaining similar prices in future years.

Animal Husbandry in Malaya In the present issue of this Journal there is published the first instalment of a series of articles dealing with the subject of animal husbandry, an important industry, which it is hoped, will begin to extend in this country within the next few years on a wider basis than in the past.

In the decade before the Japanese invasion of Malaya the Department of Agriculture had established a small stock farm at the Central Experiment Station, Serdang, where it was demonstrated that milk of the highest grade, equal in cleanliness and quality to that marketed in any part of the world, could be produced by Tamil labour under strict supervision. The Department also carried out investigations on other branches of animal husbandry, on hill stations and on the plains, especially on the production and maintenance of fodder grasses, feeding of cattle, pigs and poultry and breeding of animals and birds with the object of developing types suitable to this country, and improving the general standard of stock and poultry in Malaya. As a result of the pre-war activities in this direction a not inconsiderable local distribution of stud stock of pigs and pure and cross

breeds of poultry, had occurred. It is intended to recommence this distribution on extended lines as soon as circumstances permit, but it will take some years to re-establish the valuable stock which was lost during the Japanese occupation. Work has already commenced on goats by the importation from England, for stud purposes, of animals with high milk producing characteristics. The goat has been called " the poor man's cow " and these animals can play an important role in providing meat and milk for large sections of the population.

In 1940, Malaya imported nearly twenty three million dollars worth of livestock and livestock products which include meat, milk, eggs, ghee, cheese, butter, hides and skins. A greater local production of some of these products is desirable and possible, and there is need for encouragement and assistance to livestock keepers by the supply of better class animals, and providing facilities for improvement of cattle, buffaloes, pigs and goats by the emplacement at stud of selected sires in all centres where the services of such animals would be of value. Importations of pedigree pigs have recently been made and negotiations for additional importations are in progress. The upgrading of poultry has also received attention, and the first of several importations of new poultry stock have arrived and are being used at Cameron Highlands Agricultural Station as breeding stock.

While immediate large scale extension of animal husbandry in Malaya is limited by the funds at present available to the Department of Agriculture, and by other factors, it is thought desirable to disseminate information on the subject, and the article included in the present issue of the Journal serves as an introduction to a series of articles, written by two members of the Staff aided by the Veterinary Department. These articles cover cattle, buffaloes, pigs, and goats and were originally prepared for use as a text book in the School of Agriculture, Serdang. The senior author has made a life study of the subject and contemplates grouping the information, augmented with chapters on allied subjects, in the form of a book suitable for use in a course of instruction in this branch of agriculture, but, owing to printing and publishing difficulties, this is not at present feasible and, in order to avoid delay in publication, the information will be made available in this Journal, from time to time.

Original Articles.

EXPERIMENTS ON THE GROWING OF OFF-SEASON CROPS ON PADI LAND IN PROVINCE WELLESLEY

BY

C. W. S. Hartley,

Agricultural Officer, Penang & P. Wellesley.

In a previous article on this subject (1) an account was given of some preliminary trials at Bukit Merah Padi Test Station with vegetables grown during the off-seasons of 1933 and 1934. In these trials very poor yields were obtained, which was probably due to inadequate manuring, and the effect on the subsequent padi crops could not be determined as no proper experimental layout was at that time possible. Nevertheless, comparison with surrounding areas gave no indication that such cultivation would reduce padi yields.

Between 1935 and 1938 further off-season crops were grown and some satisfactory yields of vegetables obtained, but it was not until 1939 that an experiment on the growing of off-season crops was laid down. Unfortunately the majority of the records of these experiments were lost during the Japanese occupation and the following account is composed partly from the few records which have been recovered, and partly from my memory of the experiments carried out from 1939 onwards.

Off-season Crops grown by Chinese & Malays in P. Wellesley and Penang.

The practice of growing off-season crops was, before the war, confined to certain small and scattered areas. At Tassek Junjong in the Southern District of P. Wellesley a few Malays made a practice of growing sweet potatoes. No manure was used, low yields were obtained and it was held by many of the padi planters in the district that areas which had supported sweet potatoes during the off-season for two or three years showed the poorest padi yields in the area.

In the Northern and Central districts of P. Wellesley, many Malays planted vegetables in scattered areas of padi land adjoining the kampong land. The crops were chiefly cowpeas, ladies fingers, chillies and sometimes sweet potatoes, and they were usually manured with goat or poultry manure or, less often, with buffalo or cattle manure. In 1941, about 25 test cuttings were made on the subsequent padi crop on plots which had supported vegetables and, in each case, on an adjoining plot which had not grown vegetables. In almost every case the cutting from the vegetable plot showed the higher yield.

In the area around Relau, on the eastern side of Penang island, Chinese padi planters have been in the habit, for many years, of planting crops of groundnuts and sweet potatoes, and sometimes other vegetables, during the

PLATE I.

Groundnuts growing on Padi fields at Relau, Penang.

PLATE II.

Sweet Potatoes.

Ladies fingers and Cucumbers growing on Padi Fields at Relau, Penang.

off-season. In some fields a crop of groundnuts is planted immediately after harvest in late January or early February, and is followed by a crop of sweet potatoes in April. The sweet potatoes are still on the land while the padi for the following crop is growing in the nursery, and transplanting of the padi takes place immediately the sweet potatoes are harvested. Before the war, the groundnuts received a heavy dressing of lime amounting to 15 katis per 50 ft. bed. (about 26 piculs per acre) but there is evidence that, with the higher price of lime, there has been a reduction in the quantity used. The maximum dressings now given are about 17 piculs per acre but more usual ones are 12-14 piculs per acre. The sweet potato crop often receives no manure but may be given cattle manure before planting or prawn dust, applied to the top of the ridges, after planting. On the lower parts of the padi fields, two crops of sweet potatoes are sometimes taken instead of one crop each of groundnuts and sweet potatoes. In this case the first crop is not manured but the stubble is turned into the ridge, while for the second crop either cattle manure or prawn dust is applied. Other vegetables, such as ladies fingers, are occasionally planted in place of the groundnut or sweet potato crops, in which case the usual application of prawn dust is made. There have been no tests carried out on the effect of these crops on the subsequent padi yield, but the opinion of the padi planters themselves is that there is no appreciable effect, and certainly the padi crop in the area has shown no obvious signs of deterioration or improvement compared with adjacent areas not so tested. Plates 1 and 2 show areas of padi land in Penang under groundnuts and under sweet potatoes and vegetables. Test weighings carried out in 1941 on the groundnut crop in these areas showed that yields of about 10 piculs per acre of dry, unshelled nuts were obtained.

Analyses of soil samples from plots which had grown groundnuts and from adjacent plots which had not grown any off-season crops showed that the heavy liming had considerably increased the CaO content of the soil, and there was a suggestion that the available phosphate content had also been raised. The analyses are shown in Table I. The plot from which sample 1 was taken had almost certainly, from its position in the field, grown groundnuts for longer than any of the other plots.

Table I.

Analyses of Soil Samples from Padi Land at Relau, Penang.

N/2 Acetic Acid Extract. Parts per million.

			CaO		K_2O		P_2O_5	
Samples from Groundnut plots	Sample No.		0–6″	6″–12″	0–6″	6″–12″	0–6″	6″–12″
	1		900	516	57	29	48	20
	2		564	252	47	20	23	14
	3		457	399	48	15	14	15
		Mean	640	389	51	21	28	16
	4		339	245	27	20	21	12
Samples from fallow plots	5		421	237	49	66	14	24
	6		298	183	50	40	12	19
		Mean	353	222	42	32	18	18

Off-Season Crops at Bukit Merah Padi Test Station 1935 - 38.

During the off seasons of 1935, 1936 and 1938 vegetables were again grown at Bukit Merah and Table II shows the yields obtained in these trials.

Table II.

Off-Season Vegetables at Bukit Merah 1935 to 1938.

Crops planted	Manure	Yield in lbs. per acre (to nearest 10 lbs.)		
		1935	1936	1938
Brinjal ..	Buffalo manure	2,210	3,160	
Chillies ..	1935 3 tons/acre	2,210	140	
Ladies Fingers ..		1,660	7,070	Crops failed owing to flooding of the land in May.
Cowpeas ..	1936 10 tons/acre	2,210	6,140	
Groundnuts ..	1938 8½ tons/acre	828	—	
Groundnuts—Lime..	20 piculs/acre	1,100	—	

The much higher yields in 1936 are thought to have been due to the higher application of buffalo manure and to more favourable weather conditions. Groundnuts were also grown in 1936 but were harvested prematurely owing to heavy rain flooding the plot. No crops were grown during the 1937 off-season. The padi yield, at harvest in 1937, of the plot which had grown vegetables in 1936, was 634 gantangs* per acre which is exceptionally high for Bukit Merah where the average yield of all fields, in a good year, is about 480 gantangs per acre. The yield of the adjoining plot which had not supported vegetables was 452 gantangs per acre. In 1939 the plot which had had vegetables growing on it in the 1938 off-season yielded 654 gantangs per acre. No conclusion can, of course, be drawn from these figures, but the indication that high yields could be obtained following the cultivation of off-season crops led to the laying down of the experiments now to be described.

Off-Season Crop Experiments at Bukit Merah Padi Test Station 1939 - 41

The Bukit Merah Padi Test Station lies rather to the south of the centre of an area of some 30,000 acres of padi land in the Northern and Central districts of P. Wellesley.

In 1939 two 4 x 4 latin squares were laid down with the following four treatments.

1. Control. Normal fallow.
2. No cultivation, but 5 tons cattle manure applied at time of planting vegetables on the other plots.
3. Vegetables planted without manure (ladies fingers and cowpeas).
4. Vegetables planted with 5 tons per acre cattle manure (ladies fingers and cowpeas).

* 1 gantang padi = 5 3/5 lbs. padi.

The vegetable plots were ploughed and harvested and beds were prepared during the last week of March. Seeds were sown on April 3rd. Each plot was 32 ft. by 24 ft. and, where vegetables were planted, there were three beds each of ladies fingers and cowpeas. The record of the vegetables harvested from one of the latin squares (Square A) is shown in Table III.

Table III.

Vegetables at Bukit Merah 1939—Square A.

	Yield per plot lbs.		Yield per acre lbs.	
	Manured	Unmanured	Manured	Unmanured
Ladies Fingers	18.84	0.84	2,138	96
Cowpeas	26.33	3.34	2,990	382

It is clear from the above table that the soil at Bukit Merah must be manured in the off-season to produce any worth while yield from vegetables of this type. Vegetable yield figures from Square B, which contained the same treatments, have not been recovered but they were similar to those in Square A.

Subsequent Padi Crop in 1939 - 40 Season.

The subsequent padi crop from all plots in both squares was recorded at the 1940 harvest. Unfortunately none of the yield figures have been recovered but in the separate analysis of the two squares, and in the combined analysis, there was a substantial and significant increase in yield due to cultivation i.e. the yield from treatments 3 and 4 above was significantly greater than from treatments 1 and 2. The smaller increase of yield of the manured plots over the unmanured was insignificant in Square A but significant in Square B, and the combined analysis, i.e. the combined yield from treatments 2 and 4 was significantly greater than that from treatments 1 and 3. In a short account which was attached to the results of this experiment it is stated, however, that this latter result must be treated with some reserve owing to the low yield of one of the cultivated unmanured plots, in Square B, which was thought to be due to an attack of 'penyakit merah'* in the centre of the plot. Little or no increase of yield due to manure was shown on the uncultivated plots. The account mentioned above states "The results clearly show that, for the first year after vegetable growing, the yield of padi is considerably increased by the *cultivation* of vegetables. With regard to the lesser, but significant, increase due to manure in Square B, and consequently in the combined analysis, this result must be accepted with some reserve owing to the unaccountably low yield of plot 15..... From the general trend of the figures, however, it seems that whereas cultivation, with or without manure, has a marked effect, manure may have a slight effect when combined with cultivation."

* a physiological disease.

Off-season vegetables, 1940.—Square A was replanted with vegetables in the 1940 off-season, while Square B was left fallow for the purpose of determining whether there would be a residual effect from growing vegetables in 1939 carried over to the 1940-41 padi season. The vegetable used in Square A was sweet potatoes and the manured plots received 5 tons buffalo manure per acre. The yield figures have been lost, but it is remembered that the yield on the manured plots was exactly double that on the unmanured plots, the former yielding at about 3 tons per acre.

Padi crop 1940-41 season.—Yield figures for the padi crop on Square A, which had now supported vegetables for two off-seasons, have not been recovered, but the results were similar to those for Square A at the 1940 harvest, i.e. a significant increase in yield due to cultivation was shown while there was a small increase in yield of the manured, cultivated plots over the unmanured, cultivated plots.

Yield figures for Square B, recorded to detect any residual effect from vegetable cultivation in 1939, are shown in Table IV.

Table IV.
Yield of Padi in 1941—Square B.

Treatment in 1939 off-season	Yield per plot 32′ x 24′	Yield in gantangs per acre
1. Control. Usual fallow	44.0	467
2. Fallow and 5 tons cattle manure per acre	45.3	480
3. Cultivated. No manure	45.0	477
4. Cultivated. 5 tons cattle manure per acre	43.5	461

It is clear that the effect of growing vegetables in 1939 has not lasted into the second season. No difference in growth was apparent during the growing season.

Off-season vegetables, 1941.—Square A was replanted with vegetables (Cowpeas) in the off-season of 1941, 5 tons per acre of buffalo manure being applied as usual to the manured plots. No yield figures have been recovered but it is remembered that the plot yields were similar to those for cowpeas in 1939.

Padi crop, 1941-2.—Yield figures could not be obtained owing to the war, but from observation during the growing period it appeared that exactly the same results would be obtained as in the previous two seasons. The crop on the cultivated plots looked much better than on the fallow plots. No difference was noted between the manured and unmanured plots on either the fallowed or cultivated land.

Experiment on Groundnuts at Bukit Merah During the 1941 Off - Season.

It was decided in the 1941 off-season to start experiments with groundnuts as an off-season crop and to follow the subsequent yields of groundnuts grown with different manurial treatments. Groundnuts grown

with lime in 1935 and a small plot planted at Bukit Merah in 1940 using buffalo manure had given fair crops. The method used by Chinese at Relau in Penang has already been described, and the lime dressing applied by them was introduced as one treatment in the experiment.

The experiment was laid out in six randomised blocks with two main treatments.

1. Groundnuts planted on beds.
2. Groundnuts planted on the flat.

Each plot was divided into 4 sub-plots with the following manurial treatments.

(a) No manure.
(b) Buffalo manure, 5 tons per acre.
(c) Lime 26 piculs or 31 cwt. per acre.
(d) Lime and buffalo manure at rates in (b) and (c).

The harvested area in the sub-plots was 24 ft. x 15 ft. Spacing was 18" x 12" and, in the plots where the groundnuts were planted on beds, there were, in each sub-plot, 3 beds of 3 rows at the same spacing.

The experiment was planted between February 18th and 24th and harvested between June 18th and 20th. Growth was quicker on the plots with beds than on the ploughed plots and the appearance of the plants was better until the middle of the third month, after which there was no noticeable difference. Plots with buffalo manure at first looked better than those with lime, but this was reversed after two months when the buffalo manure plots began to look yellow and stunted. The plots with buffalo manure and lime did not appear appreciably better than those with lime alone although the yield was higher. One more weeding was necessary on the ploughed plots than on the plots with beds.

The mean yield per sub-plot and the yield per acre are shown in Table V. The difference in yield between groundnuts grown on the flat and on beds was quite insignificant. All differences between manurial treatments were significant ($P = 0.01$) and the interaction between cultivation and manurial treatments just reached significance at $P = 0.05$. The only interpretation that can be put on this latter result is that buffalo manure is rather more effective on the plots with beds than on the ploughed plots, while lime is more effective on the ploughed plots than on those with beds. The percentage of kernels to whole nuts was 73% or 74% for all treatments.

The general conclusion reached from this experiment, with 1941 prices, was that the lime repaid application at the above rate and that it was worth while applying buffalo or cattle manure, if readily available, from the cultivators, own stock but not if it had to be bought.

It had been intended that the subsequent padi yield from the plots in this experiment should be recorded, but unfortunately war broke out just before the padi reached the flowering stage. The growth of the padi in the plots showed quite distinct differences, the limed plots showing much more vigorous growth than those which did not receive lime. There was no apparent difference between the plots receiving and not receiving buffalo manure.

Table V.

Groundnut Experiment at Bukit Merah 1941.

Yield of Dried Unshelled Groundnuts in lbs.

Main Treatments	Mean yield per sub-plot 24 ft. x 15 ft.			Yield per acre		
	Plough	Beds	Total	Plough	Beds	Total
Manurial treatments. – Control ..	1.82	2.13	1.97	220	258	238
Buffalo manure ..	3.94	4.98	4.46	477	603	540
Lime ..	7.11	6.77	6.94	860	819	840
Buffalo manure & Lime ..	8.77	8.61	8.69	1,061	1,042	1,051
Mean: ..	5.41	5.62	5.52			

Discussion.

Experiments laid down at Bukit Merah have shown that the cultivation of the soil in the off-season leads, in the first few years, to increased padi yields. On this type of padi soil it is found that satisfactory off-season crops can be obtained from groundnuts by application of lime, and from sweet potatoes, ladies fingers, brinjals and cowpeas by applications of cattle or buffalo manure. Unless such manuring is undertaken little or no crop can be expected. Nevertheless it appears that, in the first few years, it is the cultivation for off-season crops, and not the manuring, which produces the subsequent increased padi yield, though it is possible that liming for groundnuts may also lead to an increase. Experiments are needed and are being laid down to follow the effect, on the padi crop, of off-season cropping over a longer period and also to determine whether smaller dressings of lime, than those applied by Chinese growers before the war, will be sufficient to maintain the yield of the off-season groundnut crop.

It is essential, if successful off-season crops are to be grown, and this applies particularly to groundnuts, that it should be possible to run off rapidly the surplus water from the March to May rains. In the Relau district of Penang the Chinese chose the higher portions of the padi fields from which excess water is easily removed. At Bukit Merah, where drainage is not so rapidly effected, off-season crops have been cultivated for eight years. In one year all crops were a total failure owing to flooding of the area, while in another year the groundnuts had to be harvested prematurely owing to heavy rain in May. It is clear, therefore, that in the successful cultivation of off-season crops drainage works have an important part to play.

Reference.

1. Baker, J. A. Fallow Crops on padi land in Province Wellesley, M.A.J. Vol. XXIII (1935) page 280.

MANILA HEMP (*MUSA TEXTILIS*)

BY

T. D. Marsh,

Senior Agriculturist.

Manila hemp, or Abaca fibre, is obtained from *Musa textilis*, which belongs to the Natural Order Scitamineae. All species of *Musa*, i.e. wild and cultivated bananas, contain a fibre, but only the fibre obtained from *Musa textilis* is of commercial value.

The plant has banana-like growth, reaching under ideal conditions an overall height of 33 ft. The part commonly referred to as the stem is really a false stem consisting of the bases of the closely packed leaf sheaths, which grow from the fleshy root stock; it is cylindrical and when mature may reach a height of 20 ft. When the plant is nearing maturity the flowering stalk is pushed up from the root through the centre of the leaf sheaths or false stem.

Manila hemp is indigenous to the Philippine Islands, in which country it is one of the more important agricultural products. The fibre, which is produced in the stem, is of excellent quality, superior to other fibres of its class in strength and resistance to sea water. For this reason it is particularly adapted for use as marine ropes.

Three varieties have been introduced from the Philippine Islands and are now established in Malaya. These varieties produce a fibre which is superior in quality to the local type.

(i) *Var. Tangongon.* A tall hardy variety which grows to a fair size even when conditions are not wholly favourable. The percentage of fibre to stems grown at Central Experiment Station, Serdang, is 1.9 per cent. to 2 per cent.

(ii) *Var. Bagulanon.* Not as hardy as Tangongon but at Serdang produces a higher percentage of fibre, 2.25 to 2.3 per cent.

(iii) *Var. Baguisanon.* Produces a low percentage of fibre, 1 to 1.50 per cent., and is not very successful at Serdang.

Manila hemp has been cultivated in Malaya only under experimental conditions by the Department of Agriculture and by a few European-managed estates. In general the Malayan climate is suitable, but plantations should not be subject to high winds which tear the leaves to ribbons. A moist atmosphere is essential. Such conditions are usually found along the foot of hills and in river valleys, but can be artificially obtained by growing a shade tree such as *Gliricidia maculata*. This interplanting promotes a moist atmosphere around the plants which appears to be favourable.

Manila hemp requires a copious and continuous supply of soil moisture, but the land must be well drained, since water-logged soils are not

tolerated. The crop also requires a rich loam soil of lasting fertility since it occupies the land for periods up to 14 years without replanting. The best soils are volcanic or rich alluvial. Volcanic soils unfortunately are scarce in Malaya but suitable alluvial soils are available in river valleys.

The values of soils for Manila hemp production in the Philippines and British North Borneo are indicated by referring to them as 10 cwt., 15 cwt., or 1 ton soils, these weights being the probable yields of fibre per acre per annum. In general, 10 cwts. of fibre per acre per annum covers only the cost of production. Ordinary Malayan soils are unlikely to yield much more than 10 cwts. per acre, and it is therefore advisable to grow the crop only on the most fertile soils.

Moderate success has been obtained at Serdang on virgin, laterite soils by growing the plants in valleys at the foot of low hills, but these areas have had the assistance of applied chemical fertilizers. Better success has been obtained on the coastal alluvial soils, although heavy clay soils are not usually recommended for the crop. It should be noted, however, that all these plantings have been on small experimental areas.

The use of farm-yard or artificial manures may be economical in promoting increased yields, but it must be appreciated that manuring cannot raise soil fertility on poor soils to equal that of inherently rich lands, and it is necessary to emphasize that this crop demands soils of high fertility.

Planting Material.

Manila hemp is usually propagated by suckers which are produced freely at the base of the parent "stem," whence they can be removed easily without interfering with the further growth of the plant. Another method is by divisions of the rootstock, but as this necessitates the removal of the entire parent the method is not economical unless it is desired to uproot and replant an area, or extend plantings.

Disease and Pests.

The stands of this crop at the Central Experiment Station, Serdang, although exposed to banana diseases such as Panama Disease, *Fusarium cubense*, and Banana Leaf Spot, *Cercospora musae*, have to date shown no signs of being affected with either fungus. A fungus, *Marasmius semiustus* sometimes attacks the leaf sheaths but the recorded occurrences have been few and the attack is only extensive on backward plants. "Bunchy-top," a virus disease capable of doing appreciable damage, has not been recorded in Malaya.

The weevil *Cosmopolites sordidus*, Germ, has been recorded as attacking the stems, but the attacks have not been serious. The caterpillar of the skipper butterfly, *Erionota thrax*, rolls the leaves on which it feeds; its presence is conspicuous but the damage does not appear to be of importance.

Planting, Cultivation and Harvesting.

Suckers are planted out in the field at a spacing of 8 to 12 ft. apart. Holes 2 ft. each way should be dug to receive the suckers. Before planting,

the holes should be filled in with surface soil from the vicinity. At planting time, a small hole just big enough to take the roots is made in the centre of the prepared hole and the suckers placed therein. The soil is then well rammed down all round the plant. During subsequent growth, every effort should be made to keep up the organic content of the soil by the methods most suitable to the particular locality, such as cover crops in the early stage, selective weeding, and later by trash in the form of dead leaves, factory and stripping refuse placed as a surface mulch around the plants.

The shade tree *Gliricidia maculata* should be planted at double distances to the manila hemp, i.e., the manila hemp is planted at 12 ft. square intervals and the shade is interplanted at 24 ft. intervals and between alternate rows of hemp. The *Gliricidia* should if possible be established before the Manila hemp suckers are planted, and it may be pruned at the beginning of the wet seasons if it is overtopping the hemp plants; the prunings should be laid around the hemp plants as a mulch and green manure.

The number of suckers permitted to develop at each stool will depend on soil fertility. On very fertile soils as many as nine per annum may be allowed to grow; on soils of lower fertility, one every two months is probably the limit that can be expected to develop with sufficient vigour to grow to the minimum height of 8 ft. to the base of the leaves. Suckers should be allowed to grow only on the perimeter of the stool in order that they can draw on a wider range of soil for their nutrients and water; suckers growing in the centre of the stool are usually less vigorous.

The first stems should be ready for harvesting between 21 and 24 months after planting, by which time the stool should consist of from 12 to 25 stems. The stems should be harvested just before or as soon as the flowering stalks appear; this is indicated by the development of an arrow-shaped "leaf" at the apex of the plant i.e. the flowering stem sheath. Stems should be cut as close to the ground as possible. Care should be taken that a sloping cut is made, otherwise rain will collect on the cut surface, favouring the ingress of fungi and bacteria which cause rotting and which may injure the root-stock and the remaining " stems " in the stool. Under good conditions each stool should yield as many as three " stems " every four months for 10 to 14 years. The minimum height of a stem suitable for harvest at flowering is 8 ft.

It is claimed by Malays in the planting of bananas (*Musa sapientum*), and in British North Borneo in the planting of Manila hemp (*Musa textilis*), that 'eyes' make the best planting material.

'Eyes' are the undeveloped buds which eventually grow into suckers; they are manifested by swellings at the base of the large pseudo-stems below ground level.

Well grown suckers removed from the parent stool and replanted often make only a stunted growth, possibly due to the severence of their roots; it is only after the suckers have produced a secondary 'stem' that a normal vigorous growth takes place.

This causes a loss of time between planting and harvesting, whereas if 'eyes' are planted there is no check in the growth of the first pseudo stem which appears above ground.

'Eyes' may be obtained by severing from the main stool the stumps of pseudo stems which have, in harvesting operations, been cut to ground level; it is necessary to take a fair amount of the parent stool to provide sufficient food material for the rapid development of the 'eye'.

Should large quantities of planting material be required it would probably be necessary to uproot an area and divide the stools.

Method of Preparation.

In order to obtain the best results, it is imperative that the fibre is extracted with as little delay after cutting as is possible.

The first process is stripping each stem into its component layers until the central flowering stem is reached. This is done with the help of a pointed knife by removing the outer layers of the leaf sheath in strips 2 to 4 ins. wide running the whole length of the sheath. The outer leaf sheaths contain a coarse and stronger fibre than the inner while the fibre from near the middle is of a fine silky texture. The inner layers of each leaf sheath is discarded since it contains little fibre. This preliminary stripping process may be done in the field to avoid bringing excess bulky material to the central stripping shed, but the strips must not be allowed to dry out; if any delay is occasioned it is advisable to cover the strips or store them in the shade until they can be transported to the factory.

The second process consists of removing the pulpy part of the strips from the fibre and this is done with the aid of a simple machine*. The machine can be modified in various ways to suit hand or power operation but, basically, it is as follows:—

A firm foundation is made on which is fixed a lever carrying a blunt knife in such a way that it can be raised or lowered by a foot treadle. When lowered it is kept in contact with a wooden block at a constant and adjustable pressure. The knife is raised to insert the strip then lowered and the strips are pulled through. The strips are again pulled through but this time in the reverse order, to clean that part which was held by the operator during the first "pull through." The fibre so produced is sorted into grades according to colour and length of fibre and hung to dry on poles supported at each end by rails. If possible, drying should be carried out in the shade since full sun drying causes the fibre to develop a yellowish straw colour.

Although the above operations appear simple, care must be taken to ensure that they are properly performed, as the manner in which this work is done affects the quality and quantity of the fibre produced. If the knife

---

* The "Hagotan" hemp stripping machine was marketed in the Philippine Islands and British North Borneo before the war.

edge is not smooth, or the pressure insufficient, some of the pulp will be left on the fibres; if the pressure is excessive a percentage of the fibre will be discarded with the pulp and the tensile strength may be reduced.

The percentage of fibre in the "stem" varies between 1 and 2 per cent. by weight depending on variety and conditions of growth.

Commercial Valuation.

In December 1946, the Department of Agriculture forwarded three samples of fibre, each of 10 lbs. weight, prepared at the Central Experiment Station, Serdang, from Manila hemp plants grown on the Station, to the Imperial Institute, London. The following extracts are taken from the report on these samples by the Plant and Animal Products Department of the Imperial Institute.

Varieties.—Bangulanon, Baguisanon, Tangongon. The samples were, on the whole, well cleaned except for a small amount of dark fibre and unseparated strands. The colour was generally good and lustrous being light to dark cream with a small amount of brownish, harsh fibre. The strength on the whole was very good, with little difference between the three samples.

Length of fibres:—Bangulanon 7 to 8½ feet
Baguisanon 6 to 8½ feet
Tangongon 6 to 8½ feet with a small amount 5 feet.

Chemical Examination of the Sample of Bangulanon Compared with 3 Grades of Commercial Manila Hemp.

	Present sample %	Commercial Samples		
		F %	C %	L1 %
Moisture	9.8	10.7	10.6	8.9
Calculated on the moisture-free fibre ash ..	0.7	1 5	1.9	3.2
(a) Hydrolysis (1% Na_2O Soln for 5 minutes) ..	11.5	13.4	12.3	12.9
(b) Hydrolysis (1% Na_2O for 60 minutes) ..	17.6	20.2	19.2	19.3
Water Washing Loss ..	1.2	2.4	3.5	5.3
Cellulose ..	78.4	76.9	74.5	74.8

The ultimate fibres of this sample were found to have the following dimensions compared with commercial Manila hemp.

	Length in mm.			Diam. in mm.		
	Max.	Min.	Av.	Max.	Min.	Av.
Present Sample ..	6.5	3.4	4.6	0.025	0.01	0.017
Commercial Manila hemp	12.0	3.0	6.0	0.032	0.016	0.024

The chemical examination shows the Malaya-grown Manila hemp (Bangulanon variety) to have a low ash content and a high cellulose content, and to suffer low hydrolysis losses in comparison with the three grades of commercial Manila hemp quoted above. The results are very satisfactory.

The samples were submitted to two firms of fibre merchants, whose representatives are members of the Imperial Institute Consultative Committee on Vegetable Fibres. Extracts from their reports are given below.

"1. Bangulanon. Good length, fine, soft, well cleaned fibre, good sheen, strength excellent. To-day's value of this fibre is £145 per ton c.i.f. United Kingdom.

Baguisanon. To-day's value £135 per ton c.i.f. United Kingdom. With a little more cleaning this could easily be equal to Bangulanon.

Tangongon. To-day's value £130 per ton c.i.f. United Kingdom. Strength good, too much strippy fibre.

All three samples would to-day find an excellent market owing to the world shortage of fibres. To-day's prices are very much inflated owing to the world shortage of all hard fibres and it would not be safe to count on getting these prices in 1948 and 1949. The pre-war values were about £26 per ton c.i.f. and the span between the different qualities would naturally be much less than on to-day's values.

Undoubtedly there would be a very good market for this class of fibre and it would compete favourably with any fibre produced in other parts of the world.

2. Bangulanon, soft, excellent spinning quality, varying from Davao "E" to Davao "J2" equivalent, averaging Davao "I" to Davao "S2".

Baguisanon, average between Davao "I" and Davao "S2" equivalent.

Tangongon, strength satisfactory: mixed, varying from Davao "F" down to Davao "L1" equivalent. Given more careful preparation—should average at least Davao "J1" equivalent.

Conclusions.—All three samples compare favourably with the commercial Manila hemp grades mentioned above. The sample of Bangulanon variety was the best of the three present samples and was valued at £130 to £145 per ton. All the samples would be readily saleable but the prices given in the valuations are exceptionally high. They represent the current values but it is not possible to say how long the market will continue at this level."

References :

1. Bishop, R. O. and Curtler, E. A. Preliminary Notes on Manila Hemp. Malayan Agricultural Journal, Vol. XIII, May, 1925.
2. D. H. Grist. An Outline of Malayan Agriculture.

UBI KEMILI, (COLEUS TUBEROSUS.)

BY

MOHAMMED SA'AID BIN SHEIK DAUD,

Agricultural Assistant, Province Wellesley Central.

Little information has so far been published in this country regarding this vegetable, which is popular in Province Wellesley, and has been grown experimentally on a small scale at Bukit Mertajam Agricultural Station. The information thus obtained is now recorded in order that attention may be directed to this useful root crop.

" Ubi kemili " is the local Malay name* for this low-growing herb, which does not appear to have an English name. It is known botanically as *Coleus tuberosus* and belongs to the family Labiatae. The stems and leaves are thick, juicy and faintly fragrant. The flowers are small, pale violet in colour, and are produced on an elongated terminal raceme. The dark brown tubers are borne in clusters at the base of the stems. An illustration of the tubers appears in " Vegetable Gardening in Malaya " page 82, published by the Department of Agriculture in 1941, and on page 132 of this Journal.

Propagation.

Stem cuttings and tubers are used for propagation but only tubers are planted in Province Wellesley. The latter are selected from the cultivators' crop harvested previously or purchased from other growers. The tubers are spread about one inch deep in a cool dry place and kept until such time as the 'eyes' on the tubers begin to sprout. The time taken for this to happen varies but sometimes it does not occur before three months.

Cultivation.

The crop grows best on a loamy soil which must be well drained. Water-logged conditions have a definite adverse effect on the crop, not only retarding the growth of the plants but also causing deformities to the tubers and reducing the yield considerably.

The land is changkolled over and levelled, and small drains constructed in and around the area to ensure good drainage. Small pieces of stick are fixed in the soil, 3 to 4 feet apart, to mark the points for planting the sprouting tubers. No manure is supplied. The local belief on this point is that any manure applied to normally fertile soils tends to produce deformed tubers and seldom, if ever, increases yields. On soils of particularly low fertility, burnt earth is applied, and where this is necessary the application is small, that is about two cigarette tins full per point. As land sufficiently fertile for this crop is usually available, the use of burnt earth is seldom resorted to.

---

* Other names used in Malaya and Java are *Kentang Kechil* (*Klichi*); *Kembili* (from the resemblance of its tubers to *Ubi torek* (*Discorea esculenta*) and *Kumbili jawa.*

The tubers are planted usually at the rate of two per point, 4 ins. to 5 ins. apart. Sometimes the number is increased to three or even four per point, spaced as already recorded, but this is said to be wasting good material as the extra number would give rise to competition and seldom result in increased yields.

In Province Wellesley planting is done at the end of the padi harvest, i.e. in February or March, and cannot be accelerated or very much delayed as it has to depend on the growth made by the tubers which have been stored for planting. Early planting would mean planting tubers still dormant, which are very liable to rot; delay in planting would result in planting, in the open, tubers with long growing stems which would suffer from exposure to the sun.

When tubers in any one point have grown and spread to form a green mass and flowers begin to appear, soil is applied sparingly to the point to cover the plants to within 3 to 4 ins. from the edge of their spread. More earth may be applied to follow the spread of the foliage, but this is said to be inadvisable as it tends to produce numerous small tubers, on the freshly covered stems, at the expense of the larger tubers already developing from near the base of the plants. This has led some growers to the other extreme of not covering the plants at all.

Harvesting.

About eight months* from planting, the crop is due to be harvested. A sure indication that the tubers are ready for gathering is that the foliage becomes yellowish and commences to wither. This may be earlier than the normal eight months, but, nevertheless, harvesting becomes necessary then, as any delay will result in loss of crop through rotting due to wet soil conditions.

Harvesting the ubi kemili crop is a popular pastime and a monopoly of the local Malay womenfolk. Cultivators therefore have little or no difficulty in getting their crops off the land. They either have their own women to do it or, more often, receive offers from women from their own or other villages who are willing to purchase their crops in situ. Digging for the tubers is a slow and tedious job; small, strong, pointed sticks being used for the purpose.

The yield of tubers sometimes exceeds one gantang (6 katies or 8 lbs.) per point, and the average for the whole area is seldom less than two chupaks (3 katies or 4 lbs.) per point. Thus with a complete stand of plants an average calculated yield of 110 piculs (1 picul—133.3 lbs.) per acre might be obtained.

Prices vary from season to season, the previous season's prevailing price was about 60 cents per gantang in the village and 80 cents in the market.

Uses

Ubi kemili is very popular among the local Malays, and is also liked by Chinese and Indians, and is consumed in various ways. It is commonly

* Crops grown from cuttings appear to be ready for harvest in four to five months after planting. [Ed.—M.A.J.].

eaten boiled with a little salt added to the water. Shredded coconut meat together with sugar makes it more palatable, whilst coconut meat juice ('santan') together with sugar, or milk with sugar, added to the cooked, cut-up tubers forms a very tasty preparation. The tubers make a good substitute for the ordinary potato in curries and they may also be fried with meat or fish to make other dishes.

Remarks.

Planting material of this crop is often limited; the space required for storage is not easy to provide so that the growers do not usually reserve more than they actually require for their own planting. The crop in consequence has been confined to permanent cultivators and to certain definite localities.

There are a number of problems that require further investigation with regard to this crop. In the first instance, the question of how best to store the 'seed' tubers in order to accelerate development of the 'eyes', to permit earlier planting, needs investigating. Exact information as to which are the best tubers for selecting as 'seed' tubers is also necessary. Opinions differ as to the number of 'seed' tubers to a point, and belief with regard to manuring is rather paradoxical. Some cultivators do not agree that covering parts of the growing plants with soil is necessary. The tuber crop is harvested just at a time when the supply of padi is becoming depleted and the ubi kemili helps to augment, for a time, the provision of rice. It will be seen that whilst there is a considerable amount of local knowledge regarding this crop there are a number of problems requiring investigation which remain to be solved by further trials.

Received for publication in March, 1947.

ANIMAL HUSBANDRY IN MALAYA

No. I. Cattle in Malaya

BY

T. D. MARSH,

Senior Agriculturist, (Research),

AND

V. DAWSON,

Principal, College of Agriculture.

Introduction.

"Animal Husbandry" may be defined as "the multiplication and management of economic animals for the production of wealth and profit." Livestock occupy a very important position in numerous countries, both temperate and tropical, and are normally kept for the production of such necessities as meat, milk and wool, and such by-products as manure, and for haulage purposes. The advent of the motor-driven truck and tractor has diminished the importance of livestock as a means of transport and haulage in many Western countries, but, in the Tropics, cattle still supply the main source of power for tillage operations and for rural transport.

The ordinary person, who is not conversant with agricultural statistics is apt to be unaware that the world trade in livestock and their products amounts to thousands of millions of dollars per annum, and that, in the British Empire alone, some 300 million people are more or less directly dependent on the land and hence, in the majority of cases, are concerned with animal husbandry in one form or another. Living in Malaya, where agriculture is largely concerned with the production of export crops, one is inclined to forget that, in many parts of the Empire, animal husbandry is more important than crop production, and that the latter is carried on chiefly with the aim of providing foodstuffs for the cultivator's animals.

In Malaya, we are naturally more interested in the types of animal husbandry practised here and in neighbouring countries, rather than in temperate countries, and the main features of this branch of agriculture in India, Ceylon, Siam and this country, are, therefore, worthy of a brief description.

India.

India has, by far, the most important animal industry in the Empire. It is estimated that there are upwards of 150 million head of cattle and 30 million buffaloes in the country. They are mainly used for draught purposes and, although their products are of comparatively little value, as draft animals they are of vital importance in the cultivation of the land. While

Mohammedans also are concerned with livestock in India and their religion does not regard the cow as a sacred animal, strong Hindu prejudices, which do so regard it, prohibit the killing or sale of cattle for food. Castrated bullocks are permitted to work, but cows can neither be worked nor slaughtered for any purpose. Female buffaloes supply most of the milk produced in India. Hindu custom affirms that cattle and buffaloes must find their own food or die. Working animals receive more attention than cows, male buffaloes, or young stock; these latter classes are often very neglected and a great wastage of stock through starvation, disease and death, takes place continuously. One of India's great problems is the excessive and inefficient cattle population. Promiscuous breeding takes place almost everywhere, with a gradual deterioration in quality. Insufficient grazing land is available to support the numbers, and this results in the production of slow-maturing animals of poor type. Such a state of affairs was not always the case. In earlier days cattle-breeding in India was largely in the hands of professional cattle-breeding tribes who, though nomadic, nevertheless kept their herds remarkably pure. Deterioration thus is of comparatively recent origin and is largely a result of the promiscuous mating of village-kept cattle.

Ceylon.

In Ceylon, religious customs have not so great a hold on the community as in India in their dealings with cattle. The climate is very similar to that of Malaya, except that parts of the Island are definitely drier and there are more pronounced wet and dry seasons. The cattle are mainly used for draught purposes but a fair trade is carried on in meat and milk. The principal difficulties are (a) insufficient grazing ground for the number of cattle kept, (b) indifference and ignorance on the part of native cattle keepers, and (c) disease, especially rinderpest and "foot-and-mouth." In the dry and padi-growing seasons shortage of grazing becomes so acute that, in many cases, resort must be had to the practice of forest browsing. Of late years, a fair amount of cross-breeding with European and Indian breeds has taken place in parts of the Island and the influence of imported animals, carrying better milking qualities, is being felt in the improvement of milk yields in individual cows. This improvement is most noticeable near the dense centres of population.

Siam.

In Siam, animal husbandry is an important branch of agriculture and a surplus of cattle and buffaloes is produced, part of which is usually exported to Malaya when the import regulations permit. During wet weather grazing is usually plentiful, but conservation of fooder is practised for and during the dry seasons. It is considered in Siam that native cattle cross well with European and Indian breeds, and improvement along these lines has received considerable attention. Pig rearing also has been emphasized, both for the home market and for export to countries such as Malaya, while in some districts horse rearing also is carried on.

Malaya.

Agriculture in Malaya has, up to the present, largely been concerned with " tree " crops, particularly rubber and coconuts, and with rice, and, because of this, animal husbandry has in the past been comparatively unimportant. Firstly, the tree crops grow well on land newly opened from jungle and their products find a very profitable world market. Secondly, there are no natural grazing areas and almost the whole of the grain crop produced is required for human consumption. Thirdly, a system of agriculture in which rice is always important, and in which the tree crops are dominant, requires very little manure for its establishment, and comparatively little power for cultivation. Finally, the above and similar reasons, in conjunction with a peasantry which has no natural bias towards livestock farming, undoubtedly explain the present inadequate position of animal husbandry in this country.

On the other hand, there has been for a considerable number of years a comparatively heavy importation of livestock and livestock products into this country, as shown in Tables I and II. It will be seen that the average value of net imports of livestock, and of livestock products, amounts to approximately 20 million dollars per annum, and that even this large figure does not include minor imports, such as those of draught animals. Table III shows the number of animals in Malaya at the end of 1940.

As to the future, three inter-dependent fundamental facts must be kept in mind:—

(a) Malayan prosperity in the past has been built on exports of a limited number of crops, such as rubber and coconuts, and tin. Tin has aptly been described as a " wasting asset ", and past slumps indicate that world markets for local export crops are notoriously fickle. The possibility of increasing substitution of artificial products for natural substances, for example, in the case of rubber, also cannot be ignored. Remembering that most of our present export crops cannot be eaten, we see from the above that, in times of slump, Malaya's income is seriously diminished; this in turn, leads to diminished imports, including those of foodstuffs for the human population, and this means for the majority of the population a lowering in the standard of nutrition.

(b) Since the world market is not subject to local control, it would appear from the above that three things are desirable:—

(1) That the range of export crops should be broadened, to avoid undue reliance on a few only.

(2) That Malaya should produce increasing quantities of food crops, particularly rice, rice substitutes e.g. root crops, legumes, and maize, and fruit, with a view to diminishing the present dependence on imported supplies.

Table I.

Livestock for Food

Net Imports and Value (nearest thousand).

Year	Cattle		Goats		Sheep		Swine		Total
	No.	Value	No.	Value	No.	Value	No.	Value	
1926 ..	45,000	$3,546,000	27,000	$ 463,000	57,000	$ 732,000	223,000	$5,597,000	$10,339,000
1930 ..	31,000	2,801,000	22,000	388,000	44,000	596,000	181,000	4,528,000	8,313,000
1934 ..	45,000	1,928,000	7,000	88,000	52,000	371,000	160,000	2,732,000	5,119,000
1938 ..	19,000	968,000	15,000	156,000	60,000	539,000	96,000	1,461,000	3,123,000
1940 ..	25,000	1,697,000	29,000	370,000	61,000	597,000	123,000	2,084,000	4,749,000

Table II.

Livestock Products and Poultry.

Value of Net Imports (nearest thousand).

Year	Meats	Milks	Butter	Poultry & Eggs	Total
1926 ..	$ 1,474,000	$12,606,000	$ 991,000	$ 1,430,000	$16,502,000
1930 ..	2,008,000	11,620,000	1,054,000	2,385,000	17,067,000
1934 ..	965,000	6,341,000	583,000	997,000	8,887,000
1938 ..	1,645,000	9,132,000	1,014,000	1,671,000	13,462,000
1940 ..	1,896,000	11,432,000	1,111,000	2,481,000	16,920,000

(3) That local animal husbandry also should be encouraged to develop beyond its present backward state, partly to reduce dependence on imports and partly to provide manure, as explained below.

(c) Any attempt to stabilise the prosperity of Malaya along the lines suggested in (b) (1) and (2) above is at present inhibited by poor soil fertility—"the basic factor controlling Malayan agriculture is the relatively low fertility of soils throughout the Peninsula." In the main, this fertility can best be maintained or improved by the development of systems of agriculture in which livestock, with its production of manure, plays an important part.

Table III.

Number of Animals in Malaya, 1940.

State or Settlement	Oxen	Buffaloes	Sheep	Goats	Pigs	Horses†
F.M.S.—						
Perak ..	29,044	15,050	1,558	57,548	112,709	102
Selangor ..	20,422	3,419	1,026	47,578	136,315	—
N. Sembilan	14,361	15,075	6,223	34,848	63,296	11
Pahang ..	6,457	29,922	6,599	25,867	24,596	68
Total F.M.S.	70,284	63,466	15,406	165,841	336,916	181
S.S.—						
Singapore*	4,400	1,100	2,500	3,500	145,000	200
Penang & P. Wellesley	8,096	7,219	500	10,590	60,678	170
Malacca ..	6,749	14,032	—	30,267	39,810	26
Total S.S.	19,245	22,351	3,000	44,357	245,488	396
U.M.S.—						
Johore ..	8,700	2,550	190‡	41,750	60,700	—
Kedah ..	58,414	66,744	37	42,987	49,966	44
Perlis ..	10,935	5,229	—	3,327	2,812	—
Kelantan ..	105,682	39,172	15,801	28,957	9,693	—
Trengganu*	25,000	20,000	2,600	5,900	5,000	—
Total U.M.S.	208,731	133,695	18,628	122,921	128,171	44
Total Malaya	298,260	219,512	37,034	333,119	710,575	621

‡ Excluding butchers' stocks. * Estimated. † 1939 figures.

Note.—This table was supplied by the Director of Veterinary Research and Veterinary Adviser, Malaya, in 1940.

Hence, in future, we may expect that animal husbandry will receive increasing attention in this country; firstly, for its own sake and in order to diminish present imports of livestock and livestock products, and, secondly, to permit a broadening and expansion of local agriculture. Malaya has in fact apparently reached a position experienced in the history of most agricultural countries, where the future development of agriculture *per se* is conditioned by a parallel development of animal husbandry.

The present position of livestock in Malaya has been summarized as follows:—

1. *Buffaloes* (a) *Malayan wide horned*, (Kerbau, Kerbau Sawah, Swamp Buffalo or Water Buffalo) used mainly for the cultivation of rice fields, the surplus animals being sold for meat and for use in the haulage of timber.

(b) *Indian Curly horned*, (Surti or Murra Buffalo, River Buffalo, Kerbau Sungai) used for milk production, the surplus animals being sold for meat and for transport and for use in the haulage of timber. Bred mainly by Northern Indian races, and able to withstand a poor diet.

2. *Cattle* (a) Those in the rural areas used in the cultivation of rice fields, the surplus animals being sold for meat and transport purposes.

(b) Milch cattle maintained for milk production (1) in the neighbourhood of towns, (2) on rubber and coconut estates; the surplus animals being sold for meat and transport purposes.

3. *Sheep*—Small numbers only, which are disposed of for meat.

4. *Goats*—Scattered throughout Malaya and sold for meat. A small number kept by Tamils are milked.

5. *Pigs*—Kept almost exclusively by Chinese in conjunction with market gardening and with tapioca production.

6. *Poultry*—(a) Kept by Chinese.
(b) Kept by Malays in the kampongs.
(c) Kept on Estates.

It has aptly been said that "in Malaya there is no livestock production industry, with its points interlinked: there is instead a series of several distinct industries which have no points of contact with each other or with the agriculture of the country. The position is admittedly complicated by racial, religious and political matters, as well as by this country's geological and climatic characteristics. Perhaps the greatest anomaly lies in the situation that whereas the chief rural land-owner, the Malay peasant, has at present little interest outside draught animals, and frequently not even that, the races most concerned with livestock i.e. the Northern Indians, normally graze their animals on vacant State land and roadsides. Whether or not greater integration of the disconnected livestock industries, both with each other, and with the agriculture of the country, is possible, advisable or necessary is still an open question. This question

is however receiving considerable attention in the quarters concerned and it is probable that the next decade will produce a very definite policy in this connexion."

Cattle in Malaya.

General Considerations.

It has been said that there are four purposes for which cattle are kept in the tropics:—

(a) For the work they do.
(b) For the meat or the milk they produce.
(c) For the by-products which are obtained from them.
(d) For the prestige their possession conveys.

The emphasis placed on the above varies in different parts of the tropics. In some parts of the world, for instance, a man's social standing is in direct proportion to the number of cattle he owns, and mere numbers are thus more important than is productivity. In Malaya, however, though the motive of prestige is not absent, cattle are kept chiefly for the haulage work they can perform and for their economic products, such as meat and milk and by-products such as manure.

The domesticated animals indigenous to any particular locality normally reflect the peculiarities of their environment, and certain aspects of a tropical environment should be considered at this stage. In the first place there is the great heat which animals in the tropics have to withstand. Indigenous animals in the course of their evolution have adapted themselves in a number of ways to offset this factor. One might mention short hair frequently of a light shade, or loose skin hanging in folds, providing a larger area from which heat can be radiated, as examples of adaptations which help cattle to remain comfortably cool in spite of frequently high external temperatures.

Again, in many cases as a result of centuries of development, indigenous tropical, "breeds" of animals have become adapted to the type of food afforded by their environment. Wherever one goes in the tropics, and particularly in monsoon areas, stock are normally short of food during certain periods of the year. Herbage becomes fibrous as the inter-monsoon dry seasons advance, grazing becomes scanty and it is the common experience that animals of the oxen or the buffalo type lose condition as the dry season progresses. Such rigorous conditions, in the common absence of supplementary feeding, mean that only those animals are able to survive whose digestive systems are highly efficient and which are thus able to extract the maximum of nourishment from the coarse food they obtain. Consequently tropical herds of cattle are, as a rule, both hardy and efficient in their utilization of food and are frequently of a size suited to their environment.

Dwarfing of Cattle and Buffaloes in the Tropics.

In many parts of India, Ceylon, Africa, Siam and Malaya cattle have in the course of time become dwarfed.

This dwarfing is attributed by some authorities to the evolution of a small body size to counteract the effects of the wet tropical heat. While the heat controlling mechanism of *Bos indicus* is far more efficient than that of *B. taurus*, the high humidity of the atmosphere of the wet tropics, interacts adversely on this heat regulating mechanism owing to the reduced evaporation of sweat from the skin. Small animals possess a greater skin surface to body size than large animals and it is suggested that the former may have developed along these lines partly for this reason.

Another reason put forward as a cause of dwarfing is inadequate minerals in the diet; this is in general discounted* as a result of analyses of fodders. Nutrition is suggested as probably having some influence on this meagre growth.

Dwarfing does not occur in all parts of India, Ceylon, or Malaya, but it is general in Malaya in the States of Kedah, Kelantan and Trengganu where oxen of the Kedah Siam breed are maintained, where the cattle population is much higher per unit area of land and where the animals are short of fodder during the time the padi is occupying the land.

It can be said that dwarfing occurs to a very limited extent in the western and southern States of Malaya where the cattle and buffalo population is more sparse. Furthermore the Kedah-Siamese breed of cattle if bred in the western areas develop into larger animals than those in their native States.

Some States of India are renowned for the rearing of large type, massive, draught oxen; which suggests that other factors in addition to climate have an influence on body size.

European cattle before the war, bred and reared in Singapore, are smaller than average for their breed. It is not known whether the calves received sufficient milk during the early weeks of life or what was the later level of nutrition. It is probable that the hot, humid climate of Singapore had an adverse influence on their growth. It can be stated that the level of nutrition is very low in many tropical countries where the cattle population is dense, and the peasant population too poor to permit the calves to have sufficient milk to nourish them, and, in addition, where concentrates cannot be purchased for the same reason.

It is considered that inadequate nutrition, from the time the calves are born up to maturity, associated with a high infestation of internal parasites are factors which have a fundamental bearing on the dwarfing of cattle in the tropics. In this respect the concentration of parasites is undoubtedly much higher in those areas where their hosts are numerous.

Disease.

Finally there is the question of disease. The indigenous tropical animal has to contend with a very vigorous insect population. Insects may act directly as parasites or irritants, as in the case of ticks, or they may convey protozoa which are responsible for such diseases as surra and

* Report on the Development of Cattle Breeding and milk production in Ceylon Nov. 1946. Norman C. Wright.

piroplasmosis. Tropical conditions also favour internal parasites, such as flatworms, round and thread worms, which cause widespread debility and lead not infrequently to death. While this is not the place to discuss immunity and disease resistance in their technical aspects, the general fact that indigenous animals usually posess a greater natural resistance to disease than do animals imported from a different environment should be carefully noted. *Bos indicus* or Zebu cattle, and the Chinese pig, for example, are normally troubled less by disease in Malaya than are pure-bred stock imported from Europe or other temperate regions.

Hence we see that, generally speaking animals indigenous to the tropics have slowly, and through the course of numberless generations, adapted themselves to meet the special circumstances of their environment. This adaptation is imperfect and is still proceeding, since natural evolution never ceases, and it is a result of what might be termed *natural* as distinct from *artificial* selection. The average cattle owner or cattle tender in the tropics is not acquainted with the principles of heredity and as one consequence controlled mating, with the idea of trying to breed to a definite and improved type, is still very rare. Unsuitable and very frequently immature males are allowed to mate promiscuously, leading to a host of resultant evils. As a rule, also, there is a complete absence of fencing, and as one authority puts it—"without enclosure there can be no true control of livestock."

In temperate regions, on the other hand, the artificial selection and breeding of livestock has been practised for centuries. In England, for instance, following the enclosure by landlords of the common land and the consequent development of larger farms, controlled livestock breeding developed very rapidly, leading to such famous farmer-breeders as Bakewell, Bates, and Booth, who flourished in the 18th century. It is of interest to the modern student to realize that men such as these, who contributed so notably to the establishment of improved breeding methods and herds of stock, were entirely ignorant of the modern science of genetics; for their notable achievements and progress they relied on sound common sense, frequent and personal observation, and the resultant skill of eye and hand.

The present position in most temperate countries is that highly specialized herds of stock have been evolved. Cows, for example, than can yield 30,000 lbs. of milk in 320 days, or say an *average* of 10 gallons per day, have been developed, and similar peaks of performance could be quoted in the case of other types of animals. High productivity of this kind has developed side by side with corresponding improvements in agricultural practice, and the provision of adequate housing and feeding, and we shall discuss later, in further articles, how the position of local livestock might be improved. The position, as will be discovered later, is not cut and dried and, while one can be dogmatic in some respects, there are many others in which the present state of our knowledge permits only of generalisation. For example, Malaya produces an insufficiency of grain even for the human

population, and the mountainous configuration seriously limits grazing and fodder crop areas. To what extent can livestock farming be developed under these conditions and to what extent can it be fitted into contemporary estate and small holding agriculture?. There is no precise answer to considerations of this nature at present, hence the need for a preliminary survey of the present position, and consideration of methods likely to bring about an improvement in the local livestock industry.

References

Quotations have been taken from:—

Faulkner, O. T. Memorandum on Animal Husbandry in Malaya, 1938.

Colonial Advisory Council Report on Allocation of Animal Husbandry Work in Malaya, 1938.

(*To be continued*)

Selected Articles.

A REVIEW OF THE PRESENT WORLD POSITION OF THE SUPPLY AND DEMAND FOR OILS AND OILSEEDS WITH SPECIAL REFERENCE TO THE BRITISH EMPIRE

BY

FRANK E. FEHR, C.B.E.*

During the war period the imported supplies of Oils and Fats, including Butter, Lard and Margarine, must be considered as satisfactory.

If we take the pre-war years we find that the imported supplies of Oilseeds (expressed in Oil content), Oils and Fats—including Butter, Lard and Margarine—(after deducting exports which were in 1937 138,559 tons and in 1938 127,328 tons) were:

In 1937—1,332,085 tons
1938—1,462,454 ,,

During the war the imported supplies of Oilseeds, expressed in Oil content, Oils and Fats—including Butter, Lard and Margarine—(after deducting exports which, except for the year 1940 when they were 46,642 tons, were quite negligible) were:

In 1940—1,397,280 tons
1941—1,313,023 ,,
1942—1,269,186 ,,
1943—1,338,937 ,,
1944—1,314,626 ,,
1945— 927,891 ,,

From these figures you will see that the percentage reduction in imports during the war was comparatively small, showing an approximate reduction of 8 to 10 per cent., but that from an average during the war of about 1,300,000 tons and pre-war average of about 1,400,000 tons we dropped in 1945 to about 927,000 tons. That explains the present shortage of oils and fats in this country.

Throughout the war period there was a considerable diminution in the import of Butter; whereas, say, in 1938 we had an import of Butter of 475,895 tons, the war imports of Butter were:

In 1940—264,350 tons
1941—218,128 ,,
1942—134,314 ,,
1943—151,609 ,,
1944—153,201 ,,
1945—190,134 ,,

---

* Given at a meeting of the Imperial Institute Consultative Committee on Oils and Oilseeds on 17th May, 1946, at the Imperial Institute. Bull. Imp. Inst. Vol XLIV, No. 3. 1946.

These figures show that the war imports varied from 134,000 tons to 264,000 tons, that is, less than half the pre-war import. This diminution was mainly due to lack of imports from the continent.

On the other hand, Lard—of which in 1938 we had an import of 72,046 tons—showed a considerable increase in imports, the year 1940 being an exception when the imports were only 34,731 tons.

In 1941 they rose to 96,569 tons
1942 ,, ,, ,, 218,495 ,,
1943 ,, ,, ,, 218,435 ,,
1944 ,, ,, ,, 189,209 ,,
1945 ,, ,, ,, 90,665 ,,

The big imports of Lard during the war were the effect of Lease-Lend. When in 1945 they dropped off because Lease-Lend came to an end, we had to look elsewhere for additional supplies of Fats.

It is rather striking that when we come to 1945 the total supplies of Oilseeds expressed in Oil content, Oils and Fats (including Butter, Lard and Margarine), show a very considerable reduction, viz. as above indicated, 927,891 tons. Butter in that year kept up to the war level; on the other hand Lard showed a considerable decrease in net imports, and Oils and Fats dropped right down to 674,774 tons (without Butter, Lard and Margarine). This was, no doubt, largely due to the fact that it became necessary to divert a considerable quantity of Oils and Fats and Lard to supply those countries which had been deprived of supplies during the war.

We have to consider what are the prospects of future supplies. No doubt in due course we shall get better supplies of Whale Oil. For the 1945-46 season the quantity expected is 130,000 tons. The next catch, viz. 1946-47, I should think might easily amount to 250,000 tons. We shall gradually get back to the 400-500 thousand tons we had pre-war.

No doubt we shall now get increased supplies of Copra and Coconut Oil. The annual import of Copra pre-war averaged 105,000 to 110,000 tons. During the war the import fell off considerably.

In 1944 it dropped to 32,398 tons.

In 1945 it was rather better at 55,392 tons.

It is stated that the Philippines are shipping at present 25,000 tons a month, and during the last six months of this year it is expected they will ship 200,000 tons. There will not be much oil from the Philippines for some long time because their factories were badly damaged. No doubt the Dutch East Indies will also start shipping and there will be larger supplies from the South Sea Islands. Undoubtedly a portion of this Copra will come to the United Kingdom. The tendency is for most of the Copra to go to the U.S.A., but there will probably be a surplus which will come here.

Whereas as against this it is to be noted that our imports of Palm Kernels pre-war averaged, say, 150,000 tons a year. During the war we received a very much larger quantity.

In 1942, for instance, we received 414,415 tons
1943 ,, ,, 499,172 ,,
1944 ,, ,, 493,635 ,,

A great effort throughout the war was made to get supplies of oils and fats and oilseeds from the West Coast of Africa as the short journey presented a considerable economy in shipping.

When we come to 1945 a good portion of the Palm Kernels were sent to other destinations and the supplies to the United Kingdom dropped down to 293,083 tons. We must expect a further diminution in the supplies of Palm Kernels to this country as the tendency will be for Kernels to be shipped to a considerable extent as pre-war to other destinations. Pre-war Germany was the main recipient. Now they are going to Belgium, Holland and Scandinavia and that cuts down supplies to this country.

In Decorticated Groundnuts pre-war we had an average supply of, say, 280,000 tons. Again here during the war the supplies received in this country increased considerably, the peak year being 1941 when we had 606,909 tons. In 1945 the quantity had again dropped to 406,479 tons. Here, again, we must expect some diminution in supplies as Groundnuts will be diverted to other centres.

Soya Beans were never a very important article for this country. Pre-war our supplies were about 95,000 tons. During the war supplies dropped to a few thousand tons a year, except for 1943 when we received a fair quantity from the U.S.A., namely 28,189 tons. Manchuria produced 4½ million tons pre-war. All that supply was cut off during the war but it is presumed that in due course Manchuria will again become an exporter of Soya Beans.

As far as Linseed is concerned, pre-war our average imports were about 290,000 tons. During the war supplies increased considerably and varied from 232,100 tons to the peak year of 1943 when they were 506,998 tons. In 1945 the imports dropped right down to 142,307 tons. It is to be hoped that with normal crops in India again we shall get better supplies of Linseed from there, and that also there will be a tendency for the Argentine to have larger quantities available for export.

Pre-war our imports of Cottonseed were about 600,000 tons. During the war imports dropped very considerably, and in 1943 we had come down to 14,411 tons, and in 1944 to 10,027 tons. In 1945 we had again some increase, and the imports amounted to 41,848 tons.

It is to be presumed that Cottonseed imports will again be greatly increased. Egypt will no doubt get back to a more normal production although, undoubtedly, she will require a larger quantity for her own consumption than formerly. During the war little Cottonseed was imported as it only has an 18 per cent. oil content.

In South America, where there has been a very largely increased production of Groundnuts and Sunflower seed, there has also been a very large increase in crushing capacity. The Argentine is now able to crush

1,350,000 tons of Sunflower seed, which is a very marked advance on what she was able to crush pre-war. Her crushing capacity is as follows:

1,350,000	tons of	Sunflower seed
217,800	,,	Cottonseed
954,000	,,	Linseed

which is a very great increase.

No doubt we shall see an extension of crushing at points of production such as South America, India, Malaya, Australia and China although crushing at the consuming centre has the advantage of giving the crusher a much wider market from which to draw his raw material.

We must expect an increased consumption of Oils and Fats the world over as the demand for soap will increase, also the demand for margarine, as vitaminised margarine tends more and more to replace butter, but it should be possible to extend the production of Oilseeds to meet this demand. We have seen the enormous advance made in the production of Palm Oil in Sumatra—a comparatively new production; in 1930 the quantity produced totalled 56,000 tons; by 1938 it had reached over 200,000 tons. The U.S.A. in 1936 produced 793,286 tons of Soya Beans; in 1944 the production totalled 5,165,973 tons. Undoubtedly in South America, Africa, Australia and also in Asia there is room for an enormous increase in supplies.

During the war fresh sources of supply were created; these will tend to continue to produce, and we shall have pre-war production steadily restored.

We can expect the Whale Oil production in due course again to reach 4-500,000 tons, and we shall again get normal butter imports. Butter home production, which pre-war totalled about 40-50,000 tons, was considerably reduced during the war, but will now slowly tend to increase.

As traders, our one fear is that restrictions and pool purchasing will tend to restrain that free movement of commodities which is essential to obtain maximum supplies.

Too much emphasis cannot be placed on the necessity of inducing a free flow of merchandise (manufactured consumer goods) to producing countries in order to encourage the maximum collection and production of supplies of Oilseeds and Oils. If the producer can get actual goods in exchange for his produce, the effect on supplies is most marked.

In Borneo and New Guinea the whole labour basis has been upset. The Australian Government has introduced certain restrictions as regards labour. The Premier of Australia has had the whole matter placed before him recently, and it is hoped that something may be done.

It will need a very great effort in all these Dominions to set the wheels of production in motion again. In twelve months we should have enough oils and fats in this country to get through; at the moment the position is most acute. I shall be very pleased to give any further details if they are required.

COPRA IN EAST INDONESIA*

East Indonesia, which comprises Celebes, the Moluccas, the Lesser Soenda Islands, and the other smaller groups of islands in that region, as a whole is economically mainly dependent upon the coconut cultivation and the copra export connected therewith. Roughly speaking, three fourths of the eight million population is directly dependent upon the yield of the coconut cultivation, as is evidenced by the export figures of Macassar for 1939, in which copra represents about 80% of the volume and roughly 60% of the value of the export.

The total copra export of the Netherlands Indies in 1939 amounted in round figures to 530,000 tons, of which 315,000 was obtained from these eastern islands.

Only about 25,000 tons was copra from estates, so that copra to the extent of fully 95% is distinctly a native product.

With reference to the data given above it must be realized that the copra of the Netherlands Indies before the war represented only a small percentage of the total world supply of oil and fat containing substances. It is not very likely that this post-war position, when after a few years the market of basic materials providing oils and fats shall have become saturated, will again become more favourable. Reports on intensifying the production of oil-containing seeds in other parts of the world rather point in the opposite direction.

The consequences of the relations expressed in the above quoted figures will have to be carefully considered from the very first by the new State of East Indonesia.

Before the war the copra exported from the Eastern Islands was mainly directed to Europe, as will be seen from the following table:

Destination of the copra exported from the Netherlands Indies in 1939 (in round figures):—

	metric tons
The Netherlands and The Netherlands in transit	175,000
Germany	70,000
Denmark	53,000
Norway	37,000
Sweden	9,000
U.S.A. Pacific coast, in transit to Mexico, and Mexico	16,000
Singapore-Penang	125,000
Italy	13,000
Switzerland	5,000
Czechoslovakia	5,000
China	7,000
Other destinations	15,000
Total	530,000

* Dol, J. Economic Review of Indonesia, Vol. I, No. 4, 1947. (Abstract).

When, after the war began in September 1939, and more specifically in April-May 1940, this market was entirely inactive, there was no further market price for copra of the Indies. The result was that a condition of emergency set in, especially in the Eastern Islands.

To make the situation supportable, the Government established the Copra Fund which later succeeded in finding new markets for copra; but after about a year and a half the Japanese invasion, beginning in 1942, made an end of it. The production of copra for export, which in mid-1939 had already received a serious set-back, now ceased entirely, to be revived here and there only in the early part of 1946. And it is only since the second half of 1946 that this production can be said to have been resumed throughout the whole of this Archipelago.

All communication within this great complex of islands and atolls is entirely dependent upon ocean transport. From the very first the Japanese discovered that these communications were exceedingly vulnerable. It did not take long before nothing could enter and nothing could leave, so that the entire area was doomed to rely upon its own supplies. Nothing could be replenished, replaced, or renewed.

After the Japanese defeat the economic demolition of this once so prosperous region proved to have been thoroughly effective. The harbour, and also the entire business district, of Macassar had been seriously damaged through bombardments. Menado and Donggala had been totally flattened out. At Gorontalo and in many other places the warehouses and port facilities had been destroyed, whilst numerous smaller places along the coast where products were accumulated and shipped, suffered serious damage from machine gunning which caused many fires.

The native proa fleet had been halved, and in certain parts been reduced by 90%, partly through acts of the Allies, and partly also through neglect, seeing that in the course of the last year of the war not a proa ventured out.

The motorized land transport material had been reduced to a minimum, and in the interior the vehicles drawn by oxen had practically disappeared because the draft animals had been slaughtered by the Japanese. At Macassar and elsewhere the Japanese themselves had to use wooden carts, with wooden axles and without tyres, propelled by man power. Everywhere the roads were neglected, and the supplies of commercial produce, both of important and export goods, were minimal. Everywhere the people were deprived of their most necessary requirements, especially where clothing was concerned. There was complete economic disorder.

Towards the end of 1945 the Copra Fund sent out men to survey the copra situation. Although certain provisional arrangements could be made in some places, it was as yet impossible to survey the situation in its entirety, for there were no means of communication, such as by boat, post, or telegraph.

According to information received, which later proved to have been reliable, it was found that at the time of the Japanese capitulation there was

available in the Eastern Islands in total about 20,000 tons of copra, that is to say less than the pre-war monthly production. This copra was available mainly in the northern part of Celebes and in the Sangir Islands, and in part had been produced some years ago!

Thus the copra supply had to be built up again from the very start. The first step in that direction was to resume contact with the copra producing population. About the middle of May 1946 a coaster, specially assigned to this end, established contact with these people. This goodwill trip lasted about ten weeks, the coaster visiting the main centres along the coast of Celebes, as also Sangir, Morotai, Ternate, and the Banggaai island group.

The head of the Agricultural Instruction and Propaganda Service arranged for meetings with the local chiefs and the copra producers.

In many places a physician gave medical assistance, the first for years; a technician of the Telegraphic Service repaired in spots the contact with the outer world, whilst a number of Copra Fund men took the necessary measures for reaching as soon as possible a resumption of the copra export.

Everywhere a certain quantity, obviously limited, of textiles, bags, tobacco, dried fish, and money, was left as an inducement for the population to resume their normal activities.

It was only after this trip, which ended in August 1946, that there was a resumption of the copra production. In August and September the first substantial supplies of textile goods were dispatched to the supply centres. The number of bags and the amounts of money had to be increased. Wherever necessary, plans were drawn up and assigned for the construction of godowns, and paraffin oil was supplied so as to prevent coconut oil from being used for lighting purposes.

In this first period numerous problems had to be solved, the main ones being the transportation difficulties. For days and sometimes weeks the first representatives of the Copra Fund went from place to place in open proas along the coast to re-establish contacts and points of accumulation. Only recently the communications have been improved, thus increasing the activity.

One of the most difficult points was to overcome the dislike of the people to work their plots which in the course of years of neglect had become overgrown with tropical undergrowth, sometimes yards high. Also the palm trees themselves were overgrown with weeds that in their turn again harboured vermin.

As soon as the production was set going again, a new problem arose, that of fetching it, which up to this day has remained one of the main difficulties. Nevertheless there is reason to assume that before long considerable improvement will be made, also in this respect.

By the end of December 1946 the Copra Fund had established 72 offices in East Indonesia, with in all 127 points where native copra was being bought, whilst furthermore on a dozen or so estates in Northern Celebes copra was stored ready for shipment.

The personnel in this region consisted of about 650 employees. The Donggala and Sangir sections were put into working order early in 1946, under circumstances that were not altogether unfavourable, with the result that there, after a while, the production attained one half and more of the pre-war capacity. In practically all the other districts it was only in the second half of 1946 that the work could be intensified, whilst it was not until the last quarter of that year that generally speaking the activities were well under way.

The work done in 1946, and mainly in the second half of that year, towards the recuperation of the copra production and the copra export of East Indonesia is in part expressed by the following (round) figures:

		metric tons
Total quantity of copra put under control of the Copra Fund East Indonesia in 1946		102,000
of which so-called " old copra "	26,000	
and new production	76,000	102,000
Of this there was exported in 1946		50,000
Local consumption and transported to other islands		7,000
Available stocks December 31, 1946, in the Archipelago		39,000
Available stocks December 31, 1946, at points of export		6,000
		102,000

So called " inducement " textiles assigned and mainly arrived .. .. .. 1,500,000 yards
Gunnybags supplied and in circulation .. 2,000,000 units

The following figures approximately indicate the course of the production of copra, in which connection it must be stated that the data covering the first half year and partly also those referring to the third quarter of the year cannot be regarded as entirely accurate.

Approximate production 1946:		metric tons
July	6,000	
August	8,300	
September	8,200	
Third quarter		22,500
October	12,000	
November	14,000	
December	11,000	
Fourth quarter		37,000
Second half year		± 60,000
First half year		± 16,000
Total		76,000

Progression:			
1st half year		..	16,000
2nd half year	3rd quarter	22,500	
	4th ,,	37,000	60,000
	Total		76,000

It must be noted that by " production " here is meant the quantity that reached the Copra Fund, which in most districts corresponds more or less to the actual production. It must also be remembered, as stated above, that in Donggala and Sangir already in mid-1946 fully one half to three quarters of the production capacity of these districts had been reached. On the other hand, the potentially very productive region of the Minahassa had in early September not reached even one tenth of its production capacity. In this last district it was mainly the serious lack of overland transportation that seriously handicapped the collection of copra. In the course of the last quarter of 1946, however, a surprising activity manifested itself there, which made the utmost demands upon the transportation and storage facilities.

The southern Moluccan Islands and the surrounding island groups are only now, in so far as copra is concerned, on the eve of their recuperation. Inadequate shipping connections had caused these areas to remain isolated longer than the other regions, so that regular production and collection could not be effected.

It must further be mentioned that the entire intermediate trade is carried on through the normal pre-war channels, that is to say by Chinese middlemen. In certain areas this trade is almost entirely in Chinese hands, whereas in other regions, especially in the Minahassa, there is a distinct tendency towards eliminating this traditional link, and to substitute for it Indonesian co-operative associations.

The widely published fact that in the Philippine Islands the pre-war copra export, and even more than that, had already been reached in 1946, has obviously caused questions to be asked with reference to the copra production in Indonesia. But it must be realized that neither the facts nor the circumstances can be compared.

The Philippine Islands were liberated in April 1945, and were immediately put under American protection. Huge quantities of import goods, army supplies, food, clothing, vehicles etc., were available and were immediately used for assisting in the economic recovery. With the aid of these unlimited supplies also the copra production was stimulated, whilst for collecting and transporting the purchased copra throughout the Philippines swarms of large and small coasting and seafaring vessels were available and could be utilized. Thanks to this abundant shipping material the copra production in the Philippines had been entirely restored in the course of 1946.

It was only a considerable time after the capitulation of Japan that a part of the Indies was put under the control of the " allied " troops.

The chaotic political conditions that soon prevailed affected the entire country, and thus it happened that we here only could begin work about a year after the Japanese capitulation, and even then with practically empty hands, in the most literal sense of the word.

The beginning had to be made by those few who had survived the camps. Many of the experienced and expert personnel had died; many also

had to be evacuated speedily to recover their health. Every branch of service was greatly understaffed, and the young and inexperienced substitutes from Holland had too little inclination to work hard and to do without things, two unavoidable elements in overcoming a state of chaos. All recovery and every extension remains limited by the lack of experienced personnel, a difficulty which thus far has not been overcome.

Those who did put their shoulder to the wheel that first year, look back upon a year of grim effort: much energy applied with the certainty of but poor results. It was a year of disappointments and reverses. But it also was a year in which the foundations were laid on which the reconstruction could be based.

Thus it is that now the moment, we hope, is approaching when the results of much difficult preparatory work will become noticeable. Throughout this archipelago as a whole, and at Macassar in particular, conditions are such that a more definite grip can be applied to the details of the organization. The Copra Fund, which had unfolded its activities only towards the end of 1946, now begins to run more smoothly. The subjoined tabulation gives its purchasing centres:

The Copra Fund establishments in East Indonesia, as at December 31, 1946:

Districts	Number of buying centres
Donggala	9
Toli-Toli	12
Menado	17
Sangir	5
Gorontalo	10
Parigi	7
Posso	16
Loewoek	16
Ternate	12
Ambon	7
Bali/Flores	7
S. Celebes	9
12 Establishments	127

Note.—In the Menado district the Copra Fund also takes up the rubber produced by a dozen estates. In the Southern Moluccas, of which Ambon is the centre, and in the Lesser Soenda Islands and Southern Celebes, the Copra Fund organization is expanding.

The interinsular traffic of the K.P.M. (Royal Packet Navigation Company) is gradually assuming pre-war proportions, and, since on January 1, 1947, it resumed control over its own ships, it has managed effectively to increase its efficiency.

A more liberal supply of workers will noticeably affect the dispatch of the sea-faring ships, which thus far were greatly delayed at Macassar. The extensive building program for the port of Macassar is approaching its completion.

In January of this year not much more than 3,000 tons of copra was exported; in February it will be in the neighbourhood of 6,000 tons.

However, the anticipated figure for the March export is 20,000 tons or even more.

Since it is expected that the production by mid-1947 will have reached 15,000 or 20,000 tons monthly, it may well be assumed that, as the accumulated supplies are gradually being shipped, the export in the coming months will maintain an average of from 15 to 20 thousand tons.

CULTIVATION OF SOYA BEANS IN THE COLONIES

BY

G. E. Blackman,

Professor of Rural Economy,

University of Oxford.

Although the soya bean will grow and ripen seed from the Equator to as far north as latitude 60° (Sweden), yet at the same time the crop is peculiarly sensitive to local climatic and environmental factors. The widespread distribution has only been achieved by the careful breeding or selection of varieties to suit the conditions of each region. In the United States alone, more than 10,000 varieties have been tested and even to-day there are over a hundred varieties in cultivation to meet the different climate conditions encountered between the Canadian border and the Caribbean seaboard.

Because of this close correlation between varietal differences and local environment, it is not possible to indicate with any precision what varieties should be selected for any new area where cultivation is proposed. On the other hand there are a number of broad principles which can serve as a basis for selecting a choice of potential varieties for trial in new areas, and preliminary trial is absolutely essential before extensive cultivation is undertaken.

Firstly, the time of flowering and the yield level is conditioned by the length of day and in this respect the range of varietal differences in soya beans is from 12 to 17 hours from sunrise to sunset. *Potentially suitable varieties in any new area should therefore be selected from countries within the same latitude.* As the difference in latitude increases, so does the chance that the varieties will fail or give low yields. For example "long day" varieties suitable to northern latitudes such as Manchuria would be a complete failure in the Tropics since they would flower, set seed and ripen when only a few inches high. Conversely, sub-tropical varieties in northern latitudes will not flower at all.

Translating this length of day factor in terms of development in the Colonies, which lie largely within the Tropics, only the very short day varieties should be tested. The most intensive selection of such short day varieties in the Tropics has taken place in the Dutch East Indies and the Philippines, and the most promising varieties from these two regions should be included in any trials in the African Colonies, British Guiana, Mauritius etc.

From the tests in East Africa on soya bean varieties, selections made in South Africa at Potchefstroom appear to be the most productive. As Potchefstroom lies 27° south of the Equator, and as in America the

southernmost States lie in approximately the same latitude north of the Equator, the principal varieties grown in this region should undoubtedly be tested in both East and West Africa. The most likely American varieties are Charlie, Creole, Delnoshat, Georgian, Monetta, Nanking, Palmetto, White Biloxi and Yelredo. Many of the American varieties so far tested in central Africa are from more northern latitudes in the States.

Similarly for Cyprus, Palestine, and the Mediterranean seaboard which lies between 32° and 36°N., the most likely source of suitable varieties is again the United States. Within this latitude range potentially successful varieties should be Clemson, Delsta, Hayseed, Mamloxi, Mammoth Yellow, Mamredo and Missoy.

Apart from the question of varieties, some indication can be given of the most suitable areas within any Colony. In general soya beans will grow where maize is successfully cultivated. Soya beans can withstand short periods of drought but demand for the greatest productivity a fairly uniform moisture supply until the pods are set, when a dry period hastens ripening. Soya beans are less frost susceptible than maize but during the growing period cold nights check growth and flowering. Soya beans have the advantage too that they are tolerant of fairly acid soils, and under these conditions the oil content of the seed tends to be higher.

Soya beans, *provided* the seed is inoculated, demand a somewhat lower state of fertility than maize. All the evidence points to the importance of seed inoculation with the correct strain of soya bean nodule bacteria if maximum production is to be achieved. Hitherto in the Colonies inoculation of the seed does not seem to have been the usual practice, but in new areas it is most unlikely that the proper bacteria are present in the soil and without inoculation the results may be disappointing. Cultures of the most biologically active strains are commercially available in England.*

Finally, the tropical and sub-tropical varieties are tall types and are probably best grown in drills three to four feet apart at a seed rate of 20-50 pounds per acre according to seed size, i.e. the smaller the seed size, the lower the seed rate. Alternatively, on land liable to erosion, provided that it is relatively weed free, the seed can be broadcast but the seed rate must be 2-2.5 times the rate for drilling.

---

* These strains are not necessarily the most suitable for use in Malaya.—Ed., M.A.J.

Notes and Comments.

The Resuscitation of the Malayan Pineapple Industry.

To meet the immediate needs of the pineapple industry His Excellency the Governor of the Malayan Union has appointed a committee with the following terms of reference.

"To consider the present position and prospects of the pineapple canning industry and to make specific recommendations to Government for its resuscitation."

This committee, under the chairmanship of the State Agricultural Officer, Johore, which has co-opted a representative of the Singapore Government, is now holding weekly meetings in Johore Bahru and will make specific recommendations to Government on all aspects of the industry including the establishment of new plantations, the modernisation of factory methods and the marketing of the canned product.

Coconut Experiment Station, Port Swettenham.

Arrangements are in hand for the rebuilding of a cheaply constructed Copra Kiln of advanced type as designed, pre-war, by the Chemist (Coconut Products), Department of Agriculture.

This kiln can be constructed by any person handy with tools, and experience has shown that it is capable of turning out a high grade product inside an overall time of two days. The kiln at Port Swettenham, when completed, will be used to demonstrate that heavy capital expenditure on kilns is not necessary in order to produce high grade copra.

Advisory Council, College of Agriculture.

A new Advisory Council to replace the pre-war Advisory Committee of the College of Agriculture was created in May, the membership being as follows:—

The Director of Agriculture, (Chairman).
The Director of Co-operation, Malayan Union.
The Director, Rubber Research Institute.
The Principal, Sultan Idris Training College, Tanjong Malim.
The Principal, College of Agriculture, Malaya.
The Director of Veterinary Services, Malayan Union.
The President of the United Planting Association of Malaya.
The President of the Malayan Estate Owners Association.
Che Mohd. Rashid bin Ahmad, Secretary of the Old Boys Association—College of Agriculture, Serdang.
Mr. P. A. Rogers, Kuala Lumpur.
Personal Assistant to the Director of Agriculture. (Secretary).

Review.

COCONUT RECIPES

Published by the Malayan Agri-Horticultural Association, Kuala Lumpur. Price 50 cents.

The reappearance of this booklet in its third edition, is particularly welcome at the present time, when the utilisation of locally produced foodstuffs is of paramount importance.

The products of the coconut palm are utilised in so many ways, that the palm is rightly regarded as one of the most valuable trees in tropical regions.

In the preface to the first edition it was mentioned that the booklet was published as a result of a recommendation, by the Malayan Vegetable Oils Committee in 1934, that a book containing instructions relating to the use of coconut products in domestic cookery should be prepared for publication. The compilation of more than 80 recipes, by Mrs. Marcus Dukes and others was begun and in due course the booklet was issued in connection with the Coconut Section of the Twelfth Exhibition of the Malayan Agri-Horticultural Association.

The present (1947) edition has been revised by Mr. H. L. Barnett and contains 109 recipes each of which indicates the appropriate method of incorporating some form of coconut product e.g. coconut vinegar, sugar, oil, " water ", " milk ", " cream " and " meat ", in curries, puddings, biscuits, cakes and bread, sweets, ice etc., and, for those who in recent years, have lived on a diet based on tapioca, a section is devoted to coconut-tapioca recipes which should not be ignored. Mr. F. C. Cooke has contributed an article on the coconut palm as a source of food and directs attention to the commercial possibilities of coconut honey.

The booklet is recommended as a useful aid to housewives already experienced in the use of coconut products, and as a guide to those who seek new ways of utilising local food products to the best advantage.

A. T.

VEGETABLE CULTIVATION IN HONG KONG

BY

G. A. C. HERKLOTS,

The South China Morning Post, Limited, Hong Kong.

April, 1947.

Price $12 (Hong Kong Currency).

The present book is an enlargement of the booklet written by Dr. Herklots in 1941. Whereas the earlier edition contained 86 pages and 38 line drawings, the present book consists of 196 pages and 86 line drawings.

The second edition was largely written whilst the author was interned in the Civilian Internment Camp at Stanley during the Japanese occupation of Hong Kong. In a brief introduction Dr. Herklots describes some of the difficulties experienced and makeshifts undertaken in order to win through in the production of vegetables in the Camp. Those of us who were similarly occupied during internment under the Japanese in Malaya have recollections of similar experiences.

The preliminary chapters describe what a gardener wants to know. The first is the Principles of Gardening which forms an excellent guide to an amateur. The section dealing with the number of light hours that influence plants is interesting and reference is made to those few vegetables which are affected by the length of daylight. Chapters on the Physical, Chemical, and Biological Properties of the Soil, Essential Elements and Fertilizers follow. The information provided is clear and supplies a general outline on the various treatments of garden soils and the use of inorganic fertilizers and organic manures.

The chapter on the Food Values of Vegetables is comprehensive and explains the human requirements of the three groups of foods, i.e. carbohydrates, fats, and proteins, and the foodstuffs to be consumed in order to supply any possible vitamin deficiencies.

Pests and their control is an interesting chapter and describes the pests and diseases encountered and suggested treatments. The lack of authority for the various recommendations suggests that more work remains to be done in this field. A short summary of the known information regarding the two new insecticides commonly known as DDT and Gammexane serves as a reminder of the possibilities of these chemicals and indicates the desirability of extended trials.

A chapter is devoted to the weeds that are troublesome in Hong Kong gardens; and to the use of sodium chlorate, and compounds that are employed in certain proprietary weed killers that may be used to control weeds.

A number of plants, that may be used as hedges in Hong Kong where much wind is experienced and wind breaks are often a necessity, are listed and described.

Dr. Herklots mentions a number of gardening books that deal with vegetables suitable for cultivation in the East and other aspects of vegetable production including the control of insect pests. It is interesting to learn that an Agricultural Department has been formed in the Colony and thus many of the problems confronting the gardener may now be investigated more fully.

These chapters take about a third of the book and the remainder deals with descriptions and cultural recommendations of the large number of vegetables that it is possible to grow in Hong Kong during certain months of the year. The line drawings prepared by the author, of which the majority were drawn during internment, are excellent and add interest and clarity to the descriptive matter. The vegetables described are given their English and Chinese names together with the respective botanical name and family. Where pests and diseases are troublesome, these are mentioned and recommendations made for their control. In many instances useful notes are added providing information regarding food values and special cultural requirements that are recorded as a result of personal observations.

It is not possible to refer to the numerous vegetables described in detail in this review. The book is of particular value to those who require authoritative information regarding the many vegetables which are known from South China. The accounts of the Chinese cabbages and allies are helpful and will enable many difficulties in the identification of these leaf vegetables to be settled. It is evident that further investigations are necessary regarding the identification of the Chinese onions, two of which are rarely grown from seed, but propagated by division of the bulbs. One of these onions was extensively grown, in Singapore, in Sime Road Civilian Internment Camp, where its cultivation and production reached a high standard.

The small section dealing with Market Vegetables is useful, and includes those crops not normally cultivated in home gardens but which are grown by market gardeners for sale and export. Several of these garden crops find their way to the shops and markets in Malaya at certain seasons of the year.

Finally, a number of vegetable recipes are included along with a full index, including Romanised Chinese names for the vegetables described.

" Vegetable Cultivation in Hong Kong " is a valuable post-war book for the gardener and Dr. Herklots is to be congratulated on its publication at a time when previous publications on the subject have been lost and are difficult to replace.

J. N. M.

Departmental.

FROM THE DISTRICTS

Compiled by the Chief Field Officer from Monthly Reports of Agricultural Officers.

March, April and May, 1947.

The Weather.

Rainfall during March was generally above average in most districts, with abnormally wet weather in most of the Western States. The North East monsoon was heavy and sustained on the East Coast, with mild flooding of the Kelantan River causing damage to food crops. Drier weather occurred in April, especially during the latter part of the month. In South Johore, however, the weather was wet throughout the month. Severe storms in parts of Selangor caused flooding. The weather was hot and dry on the East Coast during May. Wet weather was experienced in most of the Western States, with abnormally high rainfall in several districts.

Crop Reports.

Foodcrops and Vegetables.—A substantial increase in the acreage under foodcrops was reported from Malacca for the first quarter of the year. Compared with the last quarter of 1946, it is estimated that a further 3,762 acres have been planted. Fallow season cultivation of padi land is estimated to be well over 1,000 acres and very large consignments of miscellaneous vegetables and root crops were exported mostly to Singapore and Kuala Lumpur. An association of Chinese gardeners under the name of the Chinese Food Cultivators Association was formed in March, with close liaison with the Department of Agriculture. It is hoped that the members will reap the benefits of bulk purchase and co-operative marketing.

The weather experienced in Johore South during March was favourable to the cultivation and production of foodcrops and vegetables, and approximately 10,942 piculs of various vegetables and fruits were exported to Singapore.

There was increased activity in the cultivation of tapioca in the Tanjong Rambutan and Chemor Districts of Perak during May, and 4,026 piculs of tapioca flour and 1,055 piculs of tapioca pearl were exported to Singapore during the month. Large areas were maintained under sweet potatoes and groundnuts throughout the Kinta District, where sweet potatoes were sold wholesale at $6 per picul.

In Selangor, the cultivation of bitter cucumber (peria) is expanding in two areas, one on the Cheras Road and the other on the Puchong Road. This crop is grown under a system of continuous trellises. A special study is being made of this crop.

The output of vegetables at Cameron Highlands during the month of May continued steady with the anticipated seasonal rise in price from the low levels reached in April. At the end of the month cabbage was sold at $22 per picul to growers compared with $10-$14 during April. Prices of first-grade prawn dust fell to $16 per picul.

Good progress was made during March in Penang in the purchase of lime and groundnuts for free distribution to growers for use in padi fields. A total of sixty acres is expected to be planted with seed supplied by the Department. About 200 acres of off-season crops, mostly groundnuts and sweet potatoes were planted on padi land on the east side of Penang Island.

Wet Padi.—In the Tanjong Karang padi area of Selangor, the agreed average yields of padi per acre for the past season for three districts are as follows:—Sawah Sempadan 300 gantangs; Sungei Burong 250 gantangs; Sekinchang 250 gantangs.

The area planted with off-season Taiwan padi in Province Wellesley Central and North was 1,567 acres. Weather conditions were ideal to start with, but later a spell of dry weather hampered growth.

At Sungei Manik, Lower Perak, uneven ripening has necessitated harvesting by 'tuai' instead of the much more rapid 'sabit'. The crop in the older areas was quite good and 25,400 piculs of padi was purchased by the Government Rice Mill, Telok Anson, up to the end of May.

It is estimated that well over 1,000 acres of off-season padi have been planted in the inland districts of Pahang this season, of which over 600 acres are accounted for in Bentong District. Many areas were in flower during May and the crops generally were promising. It was noted that some Malays in areas adjacent to those cultivated by Chinese, were following the example of the latter in taking two crops of padi during the year.

In order to encourage the use of the plough in North Johore, a ploughing demonstration was given to interested padi planters in several mukims. At Jementah, the padi planters carried out work in the padi fields co-operatively, working in groups of six to ten persons.

The report from Kedah for May states that good progress was made in ploughing, and abandoned padi land is being brought into cultivation. Influenced by the guaranteed price a large increase in the area under padi is anticipated during the coming season.

In the Jelebu District of Negri Sembilan, considerably increased planting has been undertaken and it is estimated that there will be an increase of about 1,100 acres of padi land this season. This includes about 370 acres of new padi areas in Durian Gasing and Triang Ilir, the balance being land that was not cultivated last season. This is a substantial increase from 2,600 to 3,700 acres. In other districts, where the season is later than Jelebu good progress is being made, and a substantial increase in acreage can be confidently anticipated.

Rubber.—The heavy fall in prices has caused considerable gloom among small-holders. In Negri Sembilan, the price of No. 1 smoked sheet fell

from $52.50 per picul at the beginning of May to $35 at the end of the month.

In Johore Central, the price trend was downward with a sharp drop early in May, the fall averaging $15 per picul for both smoked and unsmoked sheet. Prices per picul for the period April-May for the three grades were as follows: smoked sheet, April $50 to $52, May $34 to $38; unsmoked sheet, April $43 to $47, May $30 to $33; scrap, April $20 to $24, May $15 to $18.

As a result of the fall in prices, almost all small and medium holdings where tappers were previously employed have ceased tapping in Province Wellesley, the tappers having to find other employment. Tapping was continued on holdings where the small holder does his own tapping.

Coconuts.—There was an all-round increase in the price of coconuts and copra in Johore. Prices for coconuts rose to $70 per 1,000 and copra $18 to $20 per picul.

Miscellaneous crops.—Some 70 acres of tobacco is under cultivation in the Baling District of Kedah, first quality leaf being sold at $140 to $150 per picul.

The planting of patchouli is still proceeding in the Jerantut District of Pahang, the estimated planted acreage being 80 acres. Chinese cultivators in Johore Central are showing interest in patchouli as a catch crop with gambier and have commenced felling jungle with the intention of planting 300 acres.

Poultry.

Poultry raising is reported to be becoming more evident throughout the villages. Duck farming is generally receiving more attention from the Chinese. Four farms in the vicinity of Malacca town have a daily output of 60 to 80 eggs from approximately 110 layers. The ration fed consists of a mixture of rice bran, tapioca refuse, copra cake and fish refuse.

The Veterinary Department carried out vaccination trials against Ranikhet disease (diptheritic stomato-pharyngitis) of poultry both at Agricultural Stations and in the villages. The effects of vaccination on the poultry at the Agricultural Station, Cameron Highlands, was rather drastic and a number of birds died. In May the flock appeared to have recovered. Elsewhere the effects of vaccination was less severe.

Miscellaneous.

Bat Guano Distribution.—The distribution of bat guano to padi planters in Kedah and Perlis for manuring their padi lands was organized by the State Agricultural Officer; during May a total of 1,470,340 gantangs was distributed. Arrangements for the distribution of bat guano from Perlis caves was also made in Province Wellesley and Kelantan.

Buffaloes.—A sum of $60,000 was provided by Government for the purchase of buffaloes from Trengganu for use of padi planters in the Pekan District of Pahang. The money is to be disbursed in the form of recoverable loans and representatives of the intending purchasers proceeded to Trengganu to do the buying themselves. The present scheme allows for the

purchase of some 200 buffaloes but applications have been received from the remaining five districts of Pahang for loan funds to cover the purchase of an additional 600 animals. Successful ploughing demonstrations were held in several parts of Raub District during May, thus reviving the pre-war efforts to replace the changkol by the plough and harrow in suitable areas of Pahang. It is virtually a restart as the great majority of the trained animals were lost during the Japanese occupation.

Destruction of Animal Pests.—All States report good results in the campaign against wild pigs, rats and, in some districts, squirrels. Wild pigs were destroyed by hunting, shooting, trapping and poisoning, and very large numbers were killed. Shortage of 12-bore ammunition became acute in almost all States and with more ammunition available it will be possible to reduce the damage to food crops by wild pigs to more reasonable limits.

DEPARTMENTAL NOTES

Bestowal of Honour.

His Majesty the King has been graciously pleased to approve the bestowal of the Honour—Honorary Companion of the Most Distinguished Order of St. Michael and St. George on His Highness Tunku Yaacob bin Sultan Abdul Hamid, State Agricultural Officer, Kedah and Perlis.

The Staff of the Department convey their congratulations to Tunku Yaacob on the well merited recognition of his services to Malaya in general, and especially to the State of Kedah, in which State he has rendered excellent services to Agriculture and stimulated rural industries by example and precept.

Retirement of Mr. Saravanamuthu.

Mr. Saravanamuthu the well known Gardens Assistant will retire from Government Service on 14.7.47. He has, since 1917, been responsible, often with the minimum of supervision by Senior Officers, for the maintenance of the Public Gardens, Kuala Lumpur, the Grounds of King's House and the Lodge of His Highness the Sultan of Perak, those of the Chief Secretary and the Residency, and, since the re-occupation, the grounds of the Resident Commissioner.

The excellent condition of the Public Gardens, up to December 1941, was not only a testimonial to his industriousness and abilities as a horticulturist but a tribute to his aptitude in the handling of labour.

This Officer was always ready to assist the residents of Kuala Lumpur and its environs in the planning, lay out, and replanting of compounds; his most extensive knowledge of tropical horticulture made his advice most valuable, and it was always tendered in a pleasant and courteous manner.

Mr. Saravanamuthu will be missed by his many friends, and his retirement from the Service will be a great loss to the Department and the general public.

The Director and Staff of the Department hope that he will enjoy his pension and rest from his labours for many years to come.

College of Agriculture, Malaya.
Opening Ceremony - 3rd. June, 1947.

The first new classes of students to be admitted to the College of Agriculture at Serdang since 1941 were enrolled on the 2nd June, 1947, and the College was declared to be open by H.E. Sir Edward Gent, Governor of the Malayan Union, at a ceremony held on the following day.

The numerous and distinguished guests were received by Mr. F. Burnett, the Director of Agriculture and Chairman of the College's new Advisory Council and Mr. V. Dawson, the Principal. Following the presentation of staff and students, to His Excellency the Governor and His Highness the Sultan of Selangor, a group photograph was taken of all present at the ceremony. The party then repaired to the College Hostel where the various addresses were delivered.

H.E. The Governor, Speaking at the Opening Ceremony.

Photo by courtesy of
The Department of Public Relations

Following upon Mr. Burnett's address of welcome to the guests and the progress report delivered by the Principal, His Excellency rose to make an historic declaration. After emphasizing the importance of agricultural education in Malaya and in the nearby territories of Borneo, Sarawak and Brunei, Sir Edward said: "Alongside the broad acres of the Research Institution and its testing grounds, the School is well placed for higher education as a residential college. Let us show our resolution by calling this Institution the College of Agriculture, and thus pledge ourselves to it's growth as the academy for the higher scientific training of students in agriculture, who will serve and save this country's land that no man may damage it, though he may use it well to produce the crops which the country and the world may need." With these words the School of Agriculture, Malaya, which first opened in 1931, was formally declared to be a College.

His Highness the Sultan of Selangor addressed the gathering in Malay. He too stressed the importance of local agriculture and impressed upon the students the importance of the practical aspects of their studies. He pointed out that labour has its own dignity and that theory and practice must go hand in hand if the students were to derive the maximum of benefit from their training at the College.

Group taken at the opening ceremony. College of Agriculture, 3rd June, 1947.

Photo by courtesy of
The Department of Public Relations

The Honourable Mr. S. B. Palmer, on behalf of the Advisory Council, staff and students, thanked the guests for their speeches and for their kindness in attending the ceremony, which was concluded by an inspection of the buildings and the partaking of light refreshments served in the Library.

Appointments, Promotions and Transfers

The Right Honourable the Secretary of State for the Colonies has been pleased to approve the promotion of Mr. V. Dawson, Vice Principal, School of Agriculture, Malaya, to be Principal, School of Agriculture, Malaya, with effect from 24th July, 1946, inclusive.

Mr. A. Thompson, Senior Plant Pathologist, has been appointed to act as Agricultural Economist and Editor, Department of Agriculture, and to act as Registrar of Statistics, Malayan Union in addition, with effect from 23rd April, 1947.

Mr. A. Johnston, Plant Pathologist, has been appointed to act as Senior Plant Pathologist with effect from 23rd April, 1947.

His Excellency the Governor has been pleased to approve the appointment of Mr. Herbert Frederick Logan to be Personal Assistant to the Chief Field Officer, Department of Agriculture, Malayan Union, with effect from 8th April, 1947.

Mr. C. E. Courtenay assumed duty in the post of Adviser, Malayan Pineapple Industry, on first appointment with effect from 9th February, 1947 and is stationed at Johore Bahru.

Mr. T. D. Marsh, Senior Agriculturist Research, was transferred to Headquarters as Field Advisory Officer to the Chief Research Officer with effect from 1st May, 1947.

Mr. H. J. Simpson, Agriculturist, assumed executive and administrative control of the Central Experiment Station, Serdang, with effect from 1st May, 1947.

Mr. G. Griffith, Chemist (Soils), Department of Agriculture, Malayan Union, has been selected by the Right Honourable the Secretary of State for the Colonies for transfer, in the Colonial Agricultural Service, as Senior Chemist, Department of Agriculture, Uganda. Mr. Griffith sailed from England for Uganda on the 2nd April, 1947.

Dr. S. G. Willimot, has been seconded to the Department of Agriculture from the Department of Chemistry and took up the duties of Chemist (Soils) as from 19th May, 1947.

Mr. G. S. Keeping, Agricultural Officer, went on transfer from Headquarters to Central Experiment Station, Serdang, on 15th April, 1947.

Mr. H. M. James, arrived at Headquarters on 21st April, 1947, on transfer from Central Experiment Station, Serdang, to act as Personal Assistant to Director of Agriculture.

Dr. A. E. S. McIntosh, Acting Deputy Director of Agriculture, acted as Director of Agriculture, from 15th March, 1947 to 14th April, 1947 and

assumed duty as Acting Deputy Director of Agriculture with effect from 15th April, 1947.

Mr. J. R. Curry, State Agricultural Officer, Negri Sembilan, has been appointed State Agricultural Officer, Pahang, with effect from 18th June, 1947.

Mr. D. G. Jones, Agricultural Officer, has been appointed State Agricultural Officer, Negri Sembilan, with effect from 21st June, 1947.

Mr. J. L. Greig, State Agricultural Officer, Kelantan, has been appointed to act as State Agricultural Officer, Trengganu, in addition, with effect from 5th May, 1947.

Mr. J. Cook, Agricultural Officer, Malacca, has been appointed to act as Agricultural Officer, Johore North, in addition, with effect from 24th May, 1947.

Inche Zakaria bin Abdul Raof has been appointed to officiate as Malay Agricultural Officer, Selangor Coast, Klang, with effect from 1st January, 1947.

Inche Kamardin bin Bahar has been appointed Malay Research Officer, Research Branch, Department of Agriculture, with effect from 10th December, 1946.

Inche Jaaffar bin Mampak has been appointed to officiate as Malay Agricultural Officer, Kelantan, with effect from 1st January, 1947.

Inche Mohd. Ramly bin Haji Tahir has been appointed to officiate as Malay Agricultural Officer, Perak Central, with effect from 1st January, 1947.

Raja Mahmud bin Raja Ali has been transferred to Pahang East as Malay Agricultural Officer with effect from 18th June, 1947.

Leave.

Mr. H. L. Barnett, Acting Agricultural Economist, Department of Agriculture, Malayan Union, has been granted 180 days leave on full pay in addition to voyage leave with effect from 24th April, 1947.

Mr. H. K. Ashby, State Agricultural Officer, Trengganu, has been granted 180 days leave with effect from 14th May, 1947.

Mr. H. D. Meads, Personal Assistant to Director of Agriculture, has been granted 192 days leave with effect from 2nd June, 1947.

Mr. R. G. Heath, State Agricultural Officer, Pahang has been granted 120 days leave with effect from 22nd June, 1947.

Mr. B. G. A. Lowe, Agricultural Officer, Cameron Highlands, returned from leave on 15th April, 1947.

Statistical.

MARKET PRICES.

June 1947.

Rubber.—In the first half of April the Singapore price of rubber dropped from 44 to 43 cents per lb. and the month ended with the price at 43⅛ cents per lb. In the first three weeks of May the price dropped from 43⅛ to 29¼ cents per lb. The rubber price advanced in the first week of June to 33⅝ cents but by 25th June had fallen back to 24⅛ cents per lb. easing to close at 25⅞ cents per lb.

The average prices paid for small-holders' rubber at three centres during the second quarter of 1947 are given in Table I.

Table I.

Average Weekly Prices Paid by Local Dealers for Small-Holders' Rubber, April-June, 1947.

(Dollars per picul of 133⅓ lbs.)

Grades	Ipoh, Perak.			Kuala Pilah, Negri Sembilan.			Batu Pahat, Johore.		
	Apr.	May	June	Apr.	May	June*	Apr.	May	June
Smoked Sheet ..	50.63	39.75	32.60	51.42	37.88	32.13	51.27	43.63	33.91
Unsmoked Sheet ..	43.25	31.25	27.00	45.08	31.62	24.63	42.95	36.68	28.16
Scrap ..	17.75	13.50	10.00	21.17	11.50	9.50	23.96	16.44	12.54

Transport from Batu Pahat to Singapore by lorry, excluding duty, $1.00 per picul.
* Average of prices for last two weeks of June only.

Table II.

Singapore Prices of Various Agricultural Products.

Product	June, 1947			May 1947	Average Price Jan.-Oct. 1941
	Highest	Lowest	Average	Average	
	per picul $	per picul $	per picul $	per picul $	per picul $
Copra:					
Sundried No. 1 ..	24.00	18.50	19.75	21.75	
No. 2 ..	*	*	*	*	2.58
No. 3 ..	*	*	*	*	2.33
Coconut Oil ..	40.00	36.00	37.00	34.75	8.64
Coffee:					
Padang Bali No. 1 ..	170.00	92.00	106.75	158.00	*
No. 2 ..	152.00	80.00	96.50	140.50	*
Palembang No. 1 ..	80.00	54.00	64.75	72.00	18.07-19.91
Sourabaya New No. 1	90.00	67.00	77.75	86.00	19.13-21.02
Bali Old ..	*	*	*	*	*
Pepper:					
Muntok White ..	115.00	98.00	111.75	97.00	15.33
Lombong White ..	109.00	91.00	103.75	87.00	*
Sibu White ..	*	*	*	*	*
New Black ..	*	*	*	*	*
Old ..	*	*	*	*	*
Sarawak ..	113.00	96.00	107.50	92.00	*
Siam Black ..	75.00†	63.00†	68.25†	65.00	*
Nutmeg:					
No. 1 ..	*	*	*	*	25.19
No. 2 ..	*	*	*	*	23.66
Cloves:					
Indian ..	45.00	41.00	43.00	41.00	*
Sumatra ..	55.00	55.00	55.00	55.00	*
Gambier:					
Cube No. 1 ..	*	*	*	*	13.65
No. 2 ..	*	*	*	*	*
Cake ..	*	*	*	*	*
Sago Flour:	18.00	13.50	14.00	15.00	*
Lingga ..	*	*	*	*	*
Local No. 1 ..	*	*	*	*	*
No. 2 ..					
Tapioca Flour:					
Malayan No. 1 ..	30.00	24.00	24.00	26.90	*
No. 2 ..	24.00	21.00	21.00	23.00	*
Java ..	*	*	*	*	*

* Not quoted.
† Quoted for first 11 days of June only.

MALAYAN UNION PRODUCTION OF PALM OIL AND KERNELS.

(In long tons as declared by Estates)

Month 1947	Palm Oil	Palm Kernels
January	2,238.2	292.3
February	2,316.9	337.1
March	2,585.8	386.2
April	2,410.2	380.2
May	2,377.7	359.9
Total ..	11,928.8	1,755.7
Total May-December, 1946 ..	11,756.4	931.6 (Aug.-Dec.)
Total Jan.-Sept., 1941 ..	38,588.4	2,332.5
Total for the year 1940 ..	57,972.1	9,611.2

Stocks on estates as at 31st May, 1947, were: palm oil 1,050 tons, palm kernels 463 tons.

In February 33 estates (planted acreage 70,816.4 acres) were in production out of a total of 46 oil palm estates (planted acreage 77,969.4 acres).

MALAYAN AGRICULTURAL EXPORTS, JANUARY, 1947.

Product	Net Exports in Tons.		
	Year 1940	Jan.-Oct. 1941	January 1947
Arecanuts	43,915	24,633	1,061
Coconuts fresh†	131,469†	178,404†	1,052†
Coconut oil	69,446	65,045	3,051
Copra	9,004*	32,682*	2,529*
Copra cake	1,215*	5,659*	282*
Gambier, all kinds ..	821	489	51
Palm kernels	9,219	1,984	210
Palm Oil	56,091	44,406	1,772
Pineapples, canned ..	40,243	15,086	320
Rubber¶	547,202¶§	500,982¶§	52,570¶
Sago,—flour	2,525	1,752*	982*
„ —pearl	4,848	6,217	24*
„ —raw	4,816*	4,400*	897*
Tapioca,—flake ..	762	601	20
„ —flour ..	2,649*	4,310*	242
„ —pearl ..	17,004	15,164	—
Derris	1,258	998	1,028

† hundreds in number. * net imports. ¶ production.

§ Malayan Union and Singapore.

MALAYAN UNION RUBBER STATISTICS.

Estates of 100 Acres and over. Production May, 1947.

In Dry Tons.

STATE	PRODUCTION						STOCKS		PREPARED LATEX PRODUCTION	
	European	Chinese	Indian	Others	Total	Total Jan./May 1947	Beginning of Month	End of Month		
(1)	(2)	(3)	(4)	(5)	(6)	(7)				
Perak ..	3,892	385	215	23	4,515	22,484	3,577	4,048	Preserved field Latex	682
Selangor ..	4,432	369	87	7	4,895	23,783	3,852	4,778		
N. Sembilan ..	3,638	288	125	94	4,145	19,329	2,544	3,097		
Pahang ..	1,235	779	126	—	2,140	8,734	1,256	1,628	Centrifuge Con-centrate	1,147
Malacca ..	1,101	352	78	—	1,531	7,728	1,052	1,283		
Penang & P. Wellesley	319	65	3	—	387	1,791	261	393	Revertex	134
Johore ..	5,555	923	230	563	7,271	30,765	4,225	5,525		
Kedah ..	3,003	386	112	26	3,527	17,170	2,304	2,673		
Perlis ..	—	3	16	—	19	108	17	16		
Kelantan ..	418	65	—	20	503	1,882	364	495		
Trengganu ..	122	66	—	6	194	660	128	154		
Total ..	23,715	3,681	992	739	29,127	134,434	19,580	24,090		1,963

Notes:—1. Figures for production of prepared latex for export are included in the month's production figures, columns 2 to 6.

2. Production by estates of less than 100 acres for May, 1947, was estimated to be 18,009 tons. Total estimated small-holding production January to May, 1947, 123,680 tons.

3. Total latex production 1946, 5,223 tons. Latex production April, 1947, field latex 519 tons, centrifuge 1,004 tons revertex 108 tons.

4. Stocks on estates of less than 100 acres are not ascertained.

5. The above forms part of the May rubber statistics published by the Acting Registrar of Statistics, Malayan Union, at Kuala Lumpur, on 21st June, 1947.

MALAYAN UNION RUBBER STATISTICS.

Acreages of Tappable Rubber Actually Tapped and not Tapped on Estates of 100 Acres and over for the Month ending 31st May, 1947.

STATE	Estimated Acreages of Tappable Rubber (9) + (11)	Acreage of tappable Rubber not tapped				Area of tappable rubber never been tapped (b)		Total Area not tapped (3) + (5) (c)		Total Area tapped during the month (c)		Area of tappable rubber rested under rotational systems (c)	
		On estates which have entirely ceased tapping		On estates which have partly ceased tapping (a)									
		Acreage	% of (3) to (2)	Acreage	% of (5) to (2)	Acreage	% of (7) to (2)	Acreage	% of (9) to (2)	Acreage	% of (11) to (2)	Acreage	% of (13) to (2)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Perak ..	272,179	1,690	.6	46,298	17.0	11,784	4.3	47,988	17.6	224,191	82.4	21,849	8.0
Selangor ..	319,451	1,317	.4	49,218	15.4	16,841	5.3	50,535	15.8	268,916	84.2	14,079	4.4
N. Sembilan ..	255,434	3,670	1.5	67,743	26.5	22,033	8.6	71,413	28.0	184,021	72.0	12,229	4.8
Pahang ..	91,840	452	.5	16,879	18.4	8,068	8.8	17,331	18.9	74,509	81.1	4,048	4.4
Penang & P. Wellesley ..	27,089	1,341	4.9	2,874	10.6	971	3.6	4,215	15.6	22,874	84.4	5,803	21.4
Malacca ..	120,163	2,394	2.0	15,968	13.3	4,610	3.8	18,362	15.3	101,801	84.7	8,511	7.1
Johore (d) ..	447,474	9,598	2.2	111,081	24.8	37,055	8.3	120,679	27.0	326,795	73.0	25,887	5.8
Kedah ..	188,704	655	.4	31,953	16.9	13,639	7.2	32,608	17.3	156,096	82.7	23,222	12.3
Kelantan ..	30,044	215	.7	11,981	39.9	2,693	9.0	12,196	40.6	17,848	59.4	291	1.0
Trengganu ..	15,488	350	2.3	6,003	38.7	826	5.3	6,353	41.0	9,135	59.0	1,086	7.1
Perlis ..	1,710	—	—	415	24.3	197	11.5	415	24.3	1,295	75.7	240	14.0
Total ..	1,769,576	21,682	1.2	360,413	20.4	118,717	6.7	382,095	21.6	1,387,481	78.4	117,245	6.6

Notes:—(a) Area out-of-tapping on estates which have partly ceased tapping refers to areas definitely being rested and excludes area on any tapping round.

(b) The acreage shown in column (7) is included in columns (3) and (5).

(c) Areas of tappable rubber rested under rotational systems are not considered as out-of-tapping and therefore columns (11) and (12) include columns (13) and (14) respectively.

(d) Registered estates only.

(e) This table was published by the Acting Registrar of Statistics, Malayan Union, on 24th June, 1947.

MALAYAN UNION RUBBER STATISTICS.

Summary of Stocks, Production, Imports and Exports of Rubber, May, 1947.

In Long Tons, Dry Weight.

		Tons	Tons
STOCKS (30th April)			
Estates	..	19,580	
Dealers	..	66,591	
Ports, awaiting shipment	..	11,470	97,641
IMPORTS	..		4,877
PRODUCTION			
Estates	..	29,127	
Small-holdings (estimated)	..	18,009	47,136
Total	..		149,654

		Tons	Tons
EXPORTS			
Foreign	..	44,767	
Local (to Singapore)	..	20,041	64,808
LOCAL CONSUMPTION	..		212
STOCKS (31st May)			
Estates	..	24,090	
Dealers	..	49,837	
Ports, awaiting shipment	..	10,707	84,634
Total	..		149,654

Note:—The above forms part of the May rubber statistics published by the Acting Registrar of Statistics, Malayan Union, at Kuala Lumpur, on 21st June, 1947.

MALAYAN UNION PADI STATISTICS.

PADI SEASON 1946—1947.

Acreages of Wet Padi harvested monthly and Estimated Yields.

STATE	Total Planted area Acres	Total to 30th April, 1947			May, 1947			Total to 31st May, 1947		
		Area Harvested Acres	Per cent (3) to (2)	Estimated Average Yield per acre (Gtgs.)	Area Harvested Acres	Per cent (6) to (2)	Estimated Average Yield per acre (Gtgs.)	Area Harvested Acres	Per cent (9) to (2)	Estimated Average Yield per acre (Gtgs.)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Perlis ..	36,640	36,640	100.0	281	—	—	—	36,640	100.0	281
Kedah ..	236,820	236,820	100.0	260	—	—	—	236,820	100.0	260
Kelantan ..	132,814	113,270	85.3	164	12,271	9.2	82	125,541	94.5	156
Trengganu ..	34,876	25,155	72.1	167	9,721	27.9	148	34,876	100.0	161
Penang & P. Wellesley ..	36,881	34,492	93.5	233	1,000	2.7	50	35,492	96.2	228
Perak ..	106,491	96,345	90.5	167	9,796	9.2	177	106,141	99.7	168
Selangor ..	34,113	18,831	55.2	301	7,000	20.5	325	25,831	75.7	307
Pahang ..	39,667	38,749	97.7	184	885	2.2	142	39,634	99.9	183
Negri Sembilan ..	29,612	29,602	99.9	196	10	.1	30	29,612	100.0	196
Malacca ..	30,611	30,611	100.0	186	—	—	—	30,611	100.0	186
Johore ..	12,835	12,835	100.0	124	—	—	—	12,835	100.0	124
Total ..	731,360	673,350	92.0	215	40,683	5.6	163	714,033	97.6	212

Notes:—1. Compiled by the Acting Registrar of Statistics, Malayan Union, from returns received through the Field Branch of the Department of Agriculture.

2. Acreages are amended according to the latest returns received. The latest return is, therefore, the most reliable.

MALAYAN UNION

PADI SEASON 1946—1947.

Acreages of Dry Padi harvested monthly and Estimated Yields.

STATE	Total Planted area Acres	Total to 30th April, 1947			May, 1947			Total to 31st May, 1947		
		Area Harvested Acres	Per cent (3) to (2)	Estimated Average Yield per acre (Gtgs.)	Area Harvested Acres	Per cent (6) to (2)	Estimated Average Yield per acre (Gtgs.)	Area Harvested Acres	Per cent (9) to (2)	Estimated Average Yield per acre (Gtgs.)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Perlis ..	60	60	100.0	103	—	—	—	60	100.0	103
Kedah ..	4,255	4,255	100.0	87	—	—	—	4,255	100.0	87
Kelantan ..	32,493	32,493	100.0	96	—	—	—	32,493	100.0	96
Trengganu ..	18,182	17,978	98.9	137	204	1.1	70	18,182	100.0	131
Penang & P. Wellesley	840	109	13.0	151	—	—	—	109	13.0	151
Perak ..	15,041	15,041	100.0	86	—	—	—	15,041	100.0	86
Selangor ..	5,802	5,802	100.0	91	—	—	—	5,802	100.0	91
Pahang ..	4,409	4,195	95.1	88	214	4.9	65	4,409	100.0	86
N. Sembilan ..	36	36	100.0	29	—	—	—	36	100.0	29
Malacca ..	120	120	100.0	198	—	—	—	120	100.0	198
Johore ..	3,052	2,479	81.2	66	Return not received			2,479	81.2	66
Total ..	84,290	82,568	98.0	101	418	.5	67	82,986	98.5	101

Notes:—1. Compiled by the Acting Registrar of Statistics, Malayan Union, from returns received through the Field Branch of the Department of Agriculture.

2. Acreages are amended according to the latest returns received. The latest return is, therefore, the most reliable.

METEOROLOGICAL SUMMARY, MALAYA, APRIL, 1947.

Locality.	Air Temperature degrees Fahrenheit							Earth Temperature		Rainfall								Bright Sunshine		
	Means of			Absolute Extremes									Number of days							
	A. Max.	B. Min.	Mean of A and B	Highest Max	Lowest Min.	Lowest Max.	Highest Min.	At 1 foot °F	At 4 feet °F	Total		Most in a day. Amt.	Precipitation .01 in or more	Precipitation .04 in or more	Thunder-storm	Fog morning obs.	Gale force 8 or more	Total	Daily Mean	Per cent.
										ins.	m.m.	ins.								
Ipoh, Perak ..	93.4	73.8	83.6	97	72	87	77			11.91	302.5	2.60	23	19	11					
Port Swettenham, Selangor	90.3	74.2	82.3	93	72	86	76	85.7	85.0	8.74	222.0	1.65	19	15	1	1				
Sitiawan, Perak ..	89.0	74.3	81.7	91	73	84	76			10.16	258.1	2.44	17	13	1	2				
Kuala Lipis, Pahang ..	89.8	73.4	81.6	93	71	78	76	84.9		21.31	541.3	3.91	21	21	1	27				
Kuantan, Pahang ..	88.2	73.9	81.1	91	72	83	77			13.75	349.3	3.96	18	18	1	3				
Bayan Lepas, Penang ..	87.7	75.3	81.5	91	73	85	77			12.37	314.2	2.40	16	14	4					
Malacca ..	85.8	75.0	80.4	89	72	83	77			5.84	148.3	2.42	17	11						
Mersing, Johore ..	86.3	73.3	79.8	92	71	78	75			8.14	206.8	1.86	21	17	3					
Alor Star, Kedah ..	89.9	74.5	82.2	93	72	84	77			7.16	181.9	3.35	17	15	3	2				
K. Trengganu, Trengganu	88.5	74.4	81.5	91	72	83	77			9.87	250.7	3.09	17	12	3	1				
HILL STATIONS.																				
Fraser's Hill, Pahang 4268 ft. ..	73.8	63.0	68.4	78	61	68	64	71.9		16.33	414.8	2.47	26	25	2	10				
Cameron Highlands, Tanah Rata, Pahang 4750 ft.	74.2	58.7	66.5	80	54	69	62	70.9		13.45	341.6	2.28	26	21	1	3				

Compiled from Returns supplied by the Meteorological Branch, Malaya.

METEOROLOGICAL SUMMARY, MALAYA, MAY, 1947.

Locality.	Air Temperature degrees Fahrenheit							Earth Temperature		Rainfall								Bright Sunshine		
	Means of			Absolute Extremes									Number of days							
	A. Max.	B. Min.	Mean of A and B	Highest Max.	Lowest Min.	Lowest Max.	Highest Min.	At 1 foot °F	At 4 feet °F	Total		Most in a day. Amt.	Precipitation .01 in or more	Precipitation .04 in or more	Thunder-storm	Fog morning obs.	Gale force 8 or more	Total	Daily Mean	Per cent.
										ins.	m.m.	ins.								
Ipoh, Perak ..	91.9	73.8	82.9	96	72	89	77			19.54	496.3	3.99	25	22	4					
Port Swettenham, Selangor	89.5	74.3	81.9	93	71	85	76	85.0	85.2	8.98	228.1	1.26	23	22	3	1				
Sitiawan, Perak ..	89.1	74.5	81.8	91	72	86	78			7.04	178.8	1.66	19	16	5	3				
Kuala Lipis, Pahang ..	91.0	73.5	82.3	93	71	85	76	84.3		7.58	192.5	1.53	19	15	2	24				
Kuantan, Pahang ..	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*			
Bayan Lepas, Penang ..	87.1	75.6	81.3	89	74	81	78			14.15	359.4	2.95	20	17	6					
Malacca ..	86.5	75.5	81.0	90	71	82	79			6.33	160.8	1.05	20	17	1					
Mersing, Johore ..	88.2	74.0	81.1	90	72	85	76			2.57	65.3	0.63	19	14	3					
Alor Star, Kedah ..	89.1	75.1	82.1	92	73	83	77			16.57	420.9	2.76	20	19	3	2				
K. Trengganu, Trengganu	90.5	74.6	82.5	94	72	88	76			3.62	91.9	2.27	8	7	7					
HILL STATIONS.																				
Fraser's Hill, Pahang 4268 ft. ..	73.8	63.8	68.7	78	61	68	65	71.5		11.39	289.3	1.49	26	20	1	8	3			
Cameron Highlands, Tanah Rata, Pahang 4750 ft.	73.0	58.5	65.7	76	53	66	62	70.8		10.18	258.6	0.99	26	24	5	2				

Compiled from Returns supplied by the Meteorological Branch, Malaya.

* Figures not received.

METEOROLOGICAL SUMMARY, MALAYA, JUNE, 1947.

Locality.	Air Temperature degrees Fahrenheit							Earth Temperature		Rainfall								Bright Sunshine		
	Means of			Absolute Extremes						Total		Most in a day.	Number of days					Total	Daily Mean	Per cent.
	A. Max.	B. Min.	Mean of A and B	Highest Max.	Lowest Min.	Lowest Max.	Highest Min.	At 1 foot °F	At 4 feet °F			Amt.	Precipitation .01 in or more	Precipitation .04 in or more	Thunderstorm	Fog morning obs.	Gale force 8 or more			
										ins.	m.m.	ins.								
Ipoh, Perak ..	93.6	74.3	83.9	98	70	88	76			8.64	219.5	2.36	10	10	5					
Port Swettenham, Selangor	90.1	73.2	81.7	93	71	83	75	84.9	85.1	3.41	86.6	1.28	6	5						
Sitiawan, Perak ..	89.3	73.8	81.5	92	70	86	76			5.31	134.9	1.82	9	7	1					
Kuala Lipis, Pahang ..	89.7	73.6	81.7	93	70	81	77	84.1	85.7	4.63	117.6	1.82	9	9						
Kuantan, Pahang ..	89.3	73.7	81.5	92	71	81	77			6.13	155.7	2.32	12	10	2					
Bayan Lepas, Penang .	87.9	75.7	81.8	90	72	83	79			4.53	115.1	1.62	11	9	5		1			
Malacca ..	85.9	74.9	80.4	89	70	79	77			5.93	150.6	1.91	12	12	1					
Mersing, Johore ..	86.9	73.9	80.4	90	71	75	77			4.13	104.9	1.52	12	9	3					
Alor Star, Kedah ..	89.4	74.9	82.1	93	72	84	78			3.98	101.1	1.04	13	12	1					
K. Trengganu, Trengganu	89.1	73.7	81.4	91	70	80	77			6.79	172.5	1.96	17	13	4	1	2			
HILL STATIONS.																				
Fraser's Hill, Pahang 4268 ft. ..	74.2	63.7	68.9	77	61	69	66	72.0		4.24	107.7	2.66	11	6	1	3				
Cameron Highlands, Tanah Rata, Pahang 4750 ft.	74.5	56.2	65.3	79	51	71	61	70.9		9.10	231.1	1.92	13	11	1					

Compiled from Returns supplied by the Meteorological Branch, Malaya.

NOTICE.

Department of Agriculture, Malayan Union.

The Director of Agriculture invites those interested to visit the Central Experiment Station and the College of Agriculture, Serdang, and also the other Experiment Stations, Agricultural Stations, Padi Experiment Stations, and Padi Test Stations, of the Department in various parts of the Peninsula.

Intending visitors to the Central Experiment Station should communicate with the Senior Agriculturist. Visitors' days at the Central Experiment Station are the first and third Wednesdays in each month. Intending visitors to the College of Agriculture should communicate with the Principal.

The Central Experiment Station and the College of Agriculture are situated about 14 miles by road from Kuala Lumpur and 3 miles from Serdang Railway Station.

Stations are listed below together with the addresses of officers to whom enquiries should be sent.

AGRICULTURAL STATIONS.

Kedah.

Gajah Mati Agricultural Station.—*State Agricultural Officer, Kedah, Alor Star.*

Kelantan.

Central Experiment Station, Kota Bharu.
Bachok Agricultural Station.
Pasir Mas Agricultural Station.
Melor Experiment Station.
State Agricultural Officer, Kelantan, Kota Bharu.

Penang and Province Wellesley.

Ayer Itam Agricultural Station.
Bukit Mertajam Agricultural Station.
Agricultural Officer, Penang and Province Wellesley, Butterworth.

Perak,

Simpang Lima Agricultural Station.
Selama Agricultural Station.
Agricultural Officer, Perak North, Taiping.
Kuala Kangsar Agricultural Station.
Ayer Tawar Agricultural Station.
Agricultural Officer, Perak Central, Kuala Kangsar.
Degong Agricultural Station.
Tanjong Malim Fruit Nursery.
Agricultural Officer, Perak South, Teluk Anson.

Selangor.

Central Experiment Station, Serdang.
Experiment Station, Kuala Lumpur.
Coconut Experiment Station, Port Swettenham.
Senior Agriculturist, Central Experiment Station, Serdang.
Cheras Agricultural Station.
Telok Datoh Agricultural Station.
State Agricultural Officer, Selangor, Kuala Lumpur.

Pahang,

Kuala Lipis Agricultural Station.
Raub Agricultural Station.
State Agricultural Officer, Pahang, Raub.
Temerloh Agricultural Station.
Malay Agricultural Officer, Pahang South, Temerloh.